AMERICAN GADGETS: CYBERNETICS, CONSUMER ELECTRONICS, AND TWENTIETH-CENTURY US FICTION

BY

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DISSERTATION

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ABSTRACT

Challenging the argument that liberal humanism faces extinction in the face of ubiquitous digital technologies, my dissertation analyzes the ways in which consumer electronics reinscribe the human subject as a privileged category in the information age. Through spaces like the Matrix, Windows 7, or even the single row of play controls on a cassette deck, gadgets preserve the concept of human autonomy by yoking personal entertainment with technical knowledge, agency, citizenship, and individuality. In American postwar fiction and film, gadgets serve powerful functions that allow authors such as Thomas Pynchon, William S. Burroughs, Neal Stephenson, Pat Cadigan, and Richard Powers to explore the complexities of humankind's responses to technological and digital innovation.

For Christopher and Shayna

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BLACKBERRY ONE: INTRODUCING AMERICAN GADGETS

In January of 2009, President Barack Obama's Blackberry addiction went public. Featured in the *New York Times*, Obama's Blackberry had been the focus of a heated battle between the President and his advisors. At stake: Obama's ability to keep a personal Blackberry device for the purposes of contacting senior aides and close friends. The *Times* revealed that so intimate was Obama's connection with his mobile device, he worried, "They're going to pry it out of my hands"(qtd in Times http://www.nytimes.com/2009/01/23/us/politics/23berry.html). But what Obama fights for so stubbornly is more than just a piece of hardware, and his bond with the pocket-sized device is not idiosyncratic. His Blackberry extends his personal space into a virtual space demarcated within electronic communication, one that extends beyond his office as President and articulates his sense of self to a social and professional milieu that remains navigable through his handheld device. And truly, this is what broader US popular culture embraces about handheld electronic devices: the ability to reposition the self as the primary mode through which to interact with a complex social, informatic, and media ecology. Obama's Blackberry is a means through which he can identify as "himself" and not the national office of President of the United States. It parses a subset of personal choices, contacts, and information as privately his. "Blackberry One" is not a just personal collection of phone numbers, emails, and text messages; it's a private portal that facilitates Obama's activity as an individuated subject in a digital age.

While the rhetoric of the *Times* article characterized Obama's relationship with his Blackberry as "obsessive," Obama's pronounced sense of ownership is more

pervasive in 2009 and at the time of this writing than the language of obsession suggests. What Obama fought to keep is no different than what so many consumers seek out and purchase every day. Despite the recession in the U.S., consumers purchased 172 billion dollars' worth of consumer electronics in 2008, a five percent increase from 2007.[1] Since its 2007 debut, revenue from the iPhone has increased by 3,400 percent,[2] and the debut of the iPhone 4 produced a crush at the gates of retailers that resulted in suspended pre-orders and inventories backordered for weeks.[3] Of the world population of 6.7 billion, over 4 billion of them are cell phone service subscribers.[4]

Consumers electronics are everywhere in the United States. And just as in the case of President Obama, these electronics are most certainly personal. Large flat-screen televisions can serve as the centerpiece of a meticulously curated living space, access the Internet, and connect to local digital storage loaded with custom content. Portable music players from the manufacturers such as Samsung, Creative, and Apple make or break morning walks, afternoon workouts, or a commute on the bus or metro. The device on the nightstand that serves as an alarm clock is also a telephone. Telephones are carried in pockets and backpacks, and often share space with personal music players, cameras, and Global Positional Satellite systems (GPS). Sometimes they are all in the same device, packaged within a single portable computer with wireless access to the internet. And sometimes is rapidly changing into all the time. What used to be fixed installations in the home—telephone, radio/stereo, personal computer—now comes in portable, pocket-sized varieties. So attached are users to their personal electronics that legislation is becoming increasingly necessary to regulate talk, texting, and mobile web use for drivers, whose

level of distraction while at the wheel surpasses that of drunk drivers.[5] In the first 80 days of sales in 2010, the Apple sold over 3,000,000 iPads.[6]

The present technocultural moment is the culmination of a decades-long consumer love affair with personal electronic technologies. But by what specific mechanisms and to what consequence has this moment arrived? Amidst a boom of personal electronics as well as myriad claims that these technologies are helpful, fun, and even necessary for living in the United States as it undergoes widespread economic decline, this project examines personal electronics as something more than a class of consumer technologies that are the provenance of corporate economics, histories of technology, and communications. More than hardware, personal electronics are a key part of the postwar American imagination of technology, personhood, and prosperity. Electronics delight users even if they have no idea how any given device actually works. Though they rapidly become obsolete, they are exciting in their embodiment of a present future. As individual devices they are impressive, but connected to other devices like them, they comprise entire social worlds. They demand from their users as much imagination and suspension of disbelief as any film, novel, or play. Personal electronics grow from the foundational object of this study: the imaginative trope of "American gadgets." Not merely material, these gadgets are a cultural configuration of electronic technologies, information, imaginative conventions, and theories of human/technology interaction. They are not mere ideological formations; gadgets are both the logic and artifacts through which much of twentieth-and twenty-first American technoculture has built its consumer citizens.

By "American gadget," I mean to set apart a special term for personal electronic database technologies as objects for literary and cultural analysis in US contexts. Gadgets are an influential human/technology configuration through which so many Americans understand and construct their identity, social space, and personal history. American gadgets empower and individuate, extending traditional American attitudes about the synergy of democracy and technological progress against a backdrop of U.S. economic decline. In contemporary vernacular, gadget is a broad term that could designate anything from a small mechanical or electronic novelty to the small desktop programs that run on the Windows Vista operating system.[7] It is not my aim to discuss which electronics or proto-electronic technologies are or are not gadgets, rather, I formulate a principle of inclusion through which we may begin to understand better American gadget technoculture. The designated form of gadget studied by this project possesses qualities that obtain across a wide variety of imagined and physical systems, for my attempts to define American gadgets approach a theory about imagination, technology, and subjectivity than merely a taxonomy of electronic devices. They are an imagined order among subjects and technology, information and networks.

First, gadgets receive and play back signals transmitted from a specific network built for those devices themselves. Examples of this functionality include devices such as televisions, radios, and even internet-ready computers. Second and most importantly, gadgets are instrumental in constructing personal archives for received information and individually-authored content. Televisions alone do not play the technical and cultural role I am discussing, but must be coupled with a recording device like a DVR, or networked with another kind of archive-generating storage technology. The combination

of TV/VCR or TV/DVD player does not simply receive signals; it helps to collect those signals into an archive for later organization and playback, whether it is a stack of cassettes recorded from HBO specials, a shelf of DVDs that have been purchased or copied, a TiVo hard disk full of television episodes, or files downloaded onto a digital cable box. At bottom, then, gadgets store and interface with personal archives of data received from networks *external to the devices themselves*. Third, gadgets simplify engagement with complex informatic systems by translating the complexities of machine architecture, code, and electronic memory into spatial metaphors that entertain before they represent. From the directional buttons on the side of a 1988 Walkman to the color-blocked software icons found in the 2010 edition of Windows Phone operating system, gadgets present metaphorical systems that interact with hardware systems, not necessarily explain them. Fourth, as an extension of the entertainment effect brought on by the former, gadgets function as a nexus of technological "cool" and amazement. Gadgets face rapid obsolescence because much of their style and appeal derives from their apparent novelty. Gadgets lose a part of their functionality once they are no longer new. While nostalgia and retrofitting are a way to reclaim obsolete technologies, this project's focus is on technologies whose attendant style and imagination are crucially predicated on novelty.

Gadgets vary in form and are manifest in various portions of American culture, from certain paradigms driving the imagination of human mind/brains to the most inexpensive handheld electronic devices. But every gadget shares the overall effect of facilitating and emphasizing the importance of consumer choices. Through networking and database creation, gadgets create opportunities for personal choices in a vast and

disorienting media ecology, making choice itself the essence of contemporary digital subjectivity. Gadgets navigate what users alone cannot navigate, suggesting an answer to one of the defining questions of new media studies, "What do we do with too much information?"[8] Simply put, we buy gadgets to help in our ongoing efforts to orient and to define ourselves. As the interface to media networks and also nodes within them, gadgets both facilitate choice and make those choices matter. Through gadgets and the personal databases they create, users become more meaningful agents in contemporary media networks in which stylistic, cultural, economic, and educational stakes continue to rise.

Crucially for scholars considering the shape of evolving American technoculture, gadgets index the continued relevance of the liberal human subject as a way to negotiate the terms of technology, identity, and culture. The personal electronics made available to the middle class in the 60s, 70s, and 80s through the postwar consumer boom are crucial manifestations of the American gadget, and they are the figurehead for a wave of American technoculture that prizes individual style, consumer choice, and personal ownership. It is important to recognize these investments (both literal and figurative) of corporate capitalism in the consumer electronics industry to observe that the rise of one of the most popular gadget forms in the U.S. came as the result of lengthy commercialization efforts that eventually allied themselves with the ideals of personal choice and style, not produced them on their own. The Sony Walkman, for instance, became a kind of fashion accessory and appealed to the contemporary semiotics of style of the 1970s and 1980s in order to link the concepts of technology and personal expression.[9]. The history of the consumer electronics industry in the United States spans back 100 years and has seen waves of failures and successes at both technological and

corporate levels. What runs throughout the development of the industry, however diverse and international its scope, is the role played by commercial interests in making gadgets possible. Advanced electronics ending up in the pockets of everyday citizens is not simply the result of U.S. technological development trickling down to the layperson; a historical examination of the industry in the United States demonstrates that the ubiquity of personal technologies is the result of a marriage of technological and commercial advances in the twentieth century.

Over the course of the 20th century, seminal electronics firms such as RCA, Sony, and Matsuhita developed from radio part and license distributors to more consolidated corporations that went on to market products like the home television set and the VCR.[10] As companies around the world traded with and copied each other, the industry became international in the scope of its competition and overall growth. As Alfred Chandler points out, the few companies around the world that started the 20th century as dominant forces remained dominant for decades. Elaborating this point, he traces a recurrent pattern in the consumer electronics industry that sets it apart from the chemical and pharmaceutical industries that were born at roughly the same time in American history: only companies that had had success with marketing previous generation consumer electronics made any reasonable progress in developing and selling new ones. Start-up companies were not altogether non-existent, but there were comparatively few. For instance, RCA, drawing from its financial and institutional foundations, built by its radio empire, led the United States in the distribution of black and white televisions. And years later, of all the American and foreign firms in business in the mid 20th century, RCA was the only company responsible for the widespread development and sale of the color

television set.[11] According to Chandler, this pattern emerged because of the great costs of developing new technology, the institutional memory needed to produce cheaply and efficiently such sophisticated technologies, and most importantly, the great cost of actually bringing a product to market.[12] RCA's foray into color television provides a striking example of this phenomenon, for even after the color set had been produced and shipped to stores nationwide, it took nearly a full decade for the company even to begin to turn a profit on their sales.[13] Similarly, IBM spent 7 billion dollars in the 1960s (nearly 40 billion in today's currency) just to cover the costs of commercializing its System 360, let alone the expenses it shouldered for research and development purposes.[14] As the first customers of the electronics industry, then, early consumers of consumer electronics demonstrated that no matter how personal the choice to buy a gadget might have been, that decision depended on the commercialization plans and massive investments of large corporations. Although newer products like netbooks and tablet computers are not subject to the same inertia in commercialization as their predecessors, all gadgets, no matter how successful, are artifacts of a mature consumer economy and culture. Gadgets reflect an achievement of consumer society, not just technological development.

But the rise of gadgets and their alliance with consumerism is one part of a larger story of technology and culture in the United States after World War II, and they by no means account for all techno-cultural work performed by post-war innovations. Gadgets emerged amidst a set of tectonic changes in the ways that Americans conceive of their relationships to technology. Where gadgets see computers and electronics as opportunities to proliferate the (perceived) freedom and importance of individual

consumers, the spread of proto-digital and digital technologies along with the emergence of postmodern culture have compromised the once stable boundaries of the very same subject. Under the growing umbrella of the "posthuman" the modern liberal subject has seen brain sciences, computer sciences, literary theory and economics all turn to models and applications that de-center human agents.[15] Characterized in literary studies by landmark pieces such as Donna Harraway's "A Cyborg Manifesto" and N. Katherine Hayles' *How We Became Posthuman* scholars began to variously to define and manifest posthumanism as technocultural movement that challenged the special place in Western metaphysics occupied by human beings. Human intelligence and embodiment, formerly treated as unique and singular phenomena, could be understood as data and computational processes, a perspective that owed its genesis to postwar World War II information technologies. But posthumanism is not a monolithic discourse. As she points out in discussing posthumanism, Hayles also calls attention to the fact that posthuman thought contains within it possibilities for radically different futures. The term emerging in Hayles' work owes its inception to the Macy cybernetic conferences in the 40s and 50s and primarily explores subjectivity and embodiment through informatics, but the term has come to encompass significantly more critical territory.

Cary Wolfe locates Hayles' already broad and synthesizing brand of posthumanism among a broader field of related posthuman discourses. Wolfe contends that this informatics-based posthumanism shares basic metaphysical suppositions with Foucault and other post-strucuralist thinkers, as both camps converge in identifying individual liberal subjects as artifacts of a fading tradition of Western thought (Wolfe xii). And most recently, the term posthumanism is still up contestation and there is no

consensus as to what the term means—Bruno Latour, Donna Haraway, Michel Foucault, Giles Deleuze, Felix Guattari, Maturana, Varela, Badmington, Joel Garreau, Michael Benedikt, Niklas Luman, Fredrich Kittler, Hans Moravec, Rosanne Alquere Stone, William Gibson, Charles Stross, and STELARC (just to name a few) are all in their own ways identified or self-identified as posthuman thinkers, artists, and beings. Wolfe even points to "transhumanism" as a form of posthumanism that is more interested in celebration and preservation of rational humanism than anything else. Even as human invention pushes its constituency towards future forms that will not be recognized as human by present sensibilities, transhumanists locate the defining characteristics of humanity in rationality, scientific achievement, and empirical thought (xiii). Amidst this confusion, Wolfe adds his own sense of what can be gained through the concept of a posthuman:

> the perspective I attempt to formulate here—far from surpassing or rejecting the human—actually enables us to describe the human and its characteristic modes of communication, interaction, meaning, social significations, and affective investments with greater specificity once we have removed meaning from the ontologically closed domain of consciousness, reason, reflection, and so on (xxv)

Wolfe takes as posthumanisms greatest advantage its recognition, though not necessarily elimination, of the mechanisms and assumptions that constitute humanity subjectivity, liberal, post-structuralist, or otherwise.

As diverse as posthumanism has been as a cultural terrain, all versions, including Wolfe's, tend to share the assumption that the concept of humanity is undergoing collective revision, transforming from the central figure of liberal political philosophy,

Western technoscience, popular culture, capitalist economics, and (often) U.S. literature to an open aggregation of environmental, technological, biological, cultural, and psychological components. But this perspective, as Fred Turner demonstrates, has some of its roots in counter-cultural movements in the middle of the century that originally sought to protect human beings and their sovereignty. Fred Turner shows that what so many scholars describe as a posthuman turn emerged out of a conflict about how to interpret the relationship between human beings and machines. Citing student protests in the 1960s, he explains that during the years of early computing, machines and computers were emblems of bureaucratic control and alienation. Students of the Free Speech Movement, disgusted by the idea of reducing human beings to mere components of larger computational and mechanical processes christened this disease "IBM syndrome." These opponents of mechanization would change their rhetoric, however. Turner's history traces the ways in which, between the 60s and the 90s, the same generation that saw computers as antagonistic to human beings began to see the developing digital technologies as opportunities to demonstrate personal creativity and ultimately a new kind of human power. By seeing human beings as information-processing devices, all kinds of new opportunities for research, self-expression, and commerce arose (21). Humanist counterculture gave birth to posthumanist cyberculture, but what remained throughout this transformation was a powerful belief, however repressed by computational metaphors, in human beings as decision-making agents. For the aging generation that starred in 60's counter-culture, the .com 90s presented the freedoms of choice they sought to preserve, albeit constrained and appropriated by the corporate-technological regimes they once tried to destroy.

Tracing the transformations of counter-culture wrought by the "valving" proponed by Buckminster Fuller to the Whole Earth Catalog to the development of the World Wide Web, Turner argues convincingly for the continuities between the 1960s and the 1990s. Even though his narrative is largely concerned with the birth of cyberculture, his history is valuable to this project because it also attests the ways in which individual choice remains a salient value to be upheld through the development and distribution of digital technologies. For Turner, in the years between the postwar technology and consumer boom and the advent of the so-called "information age," choice, personal space, creativity, style, and technology become associated with one another, not antagonistic terms to be placed on either side of a human/machine divide. By the late 1970s the rebels of *Star Wars* could fight against the bureaucratic forces of The Empire by flying spaceships, shooting lasers, and using computers without any concerns about their technological means compromising their idealist ends. This preservation and enhancement of style and human identity through technological means is significant for understanding the contours of American posthuman technocultures, but it is also the foundation from which the gadget user, so qualitatively different from the posthuman, has grown for the last half-century. Style, individuality, and choice are the cornerstones of gadgets in the United States.

Gadgets exemplify and reproduce a key set of assumptions about technology that possesses a great deal of currency in contemporary American culture: technology amplifies liberal subjectivity, not threatens it. Because the key functionality of gadgets is to enable their users to navigate vast quantities of data and to help them choose, archive, and consume the media of their choice, gadgets can be thought of as a metaphysic that

exists apart from cyborg metaphysics and cyborg subjectivity, however various the instantiations of the former and the latter may be.[16] The cyborg bears witness to the integration of data with concepts like subjectivity and embodiment; the gadget insists that these terms remain discrete. Gadgets help their users to carve out a personal (and portable) space of deliberately organized information and media that previously had not been available for collection under older technologies. A music fan may not own the music s/he has copied onto his/her MP3 player (in the sense that the record company owns it), but it is still "a personal music collection." S/he doesn't own the data (instead buying access to it), but s/he takes ownership of the logic and style that selects the music and organizes it for archiving. In this sense, gadgets allow their users to control information, or at least, appear to construct themselves as the "author" or "editor" of archives. This granted control is significant; it restores the potency of the liberal subject in the face of the dizzying arrays of informational influence that threaten to fragment it with virtual and cybernetic metaphysics. The archive insulates and even inspires the consumerist liberal subject by granting autonomy, control, and narcissistic arrangement of information according to individual taste. As a consequence of their reinscription of liberal subjectivity, gadgets also reinforce the delusion that technology is discrete from human beings, not part of a dynamic network between non-human technologies and human subjects. They foster the kind of narcissism/narcosis similar to that which McLuhan described in the 1960s, a denial of technology's imbrications with human beings, "Such amplification is bearable by the nervous system only through numbness or blocking of perception"(43).[17] Gadgets ultimately preserve the pervasive technological binary of user/used that runs throughout western democracy and contemporary

capitalism. Like McLuhan's vaguely defined "gadget," these electronic gadgets participate in the slippage between narcissism and narcosis; a subject's infatuation with individual autonomy represses the ways in which the boundaries of that subject are always already compromised. The hyperhuman gadget user emerges as a response to the posthuman.

Importantly, this hyperhuman gadget user has a definite American nationality. The re-inscription of the liberal humanist subject metonymically reinvigorates the notion of an American nation and the capability of its citizens. Just as gadget users must repress the cybernetic implications of the technologies that enable their activity, American gadgets repress a global-economic reality that sees manufacture in Asia, consumption in the U.S., and disposal in Africa.[18] Beginning with portable transistor radios, in the 1950s and1960s, U.S. electronic manufacturers like RCA, Zenith, and Regency ceded the national market to companies like Sony, Matsushita, and Tokyo Telecommunications.[19] Currently in 2011, brands like Panasonic and LG—of Japanese and Korean manufacture, respectively—are household names. American football player Peyton Manning is a spokesman for Sony high definition televisions. *Medal of Honor*, a video game franchise about American military operations, is a bestselling title for the Sony Playstation. Advertisements for Panasonic Veirra Televisions show the flatscreen as the new hearth of the American home.[20] Apple Computer, the epicenter of a portable music and style empire in the United States, manufactures its hardware in China. Re-valencing imported technology, therefore, is an integral part of how many Americans represent to themselves defining features of U.S. culture.

Yet for all this re-signification, consuming electronics in the United States, though those electronics enable consumers to imagine citizenship ideals such as choice, independence, and increased freedom of expression, participate in a global marketplace that indexes the decline of American economic solvency. Against the reality of a soaring national debt and mentions of "American decline" by pundits and news magazines, American gadgets re-brand imported Asian technologies as venues for American sensibilities of personal empowerment, entertainment, and style. This yoking of consumer choice and fun to a broader American political identity extends Lizabeth Cohen's concept of "consumer citizenship."[21] As consumption became a duty of citizenship, the consumer's right to choose emerged in the postwar U.S. as an obligation of the American democratic state to its citizens. Here, political freedom and maximum range of consumer choice become equivalent concepts.[22] For gadgets, plentitude of entertainment, choice, and self-expression index the success of the U.S. nation state and extend the concept of consumer-citizenship into the context of personal technology and entertainment, just as corporations and government agencies in the 1950s believed that the affluence of the middle class was a hallmark of the American way of life.[23] Gadgets, then, are not fading out of relevance as a posthuman age looms; they are and have been crucial mechanisms through which a consumerist liberal democracy can imagine its future survival through an alliance between its values, citizens, and personal technologies.

Just as the cyborg is simultaneously a tool of science, a kind of technology, and a metaphysic of technoculture, the gadget serves as an organizing logic for both materials and ideas. Again, posthumans and gadgets are not mutually exclusive; it is crucial to

recognize that they are both opposing poles of a broader cultural dialectic that negotiates the relationship between humans and technology, between user and information. Posthumanism is not slowly working on leaving liberal gadget logic behind; rather, each term seeks to contain the contradictions posed by the other. Gadgets repress the implications of posthumanism in order to operate as effective subject-building technologies, and the posthuman perspective must disavow the gadget imagination before any genuine interpenetration among humans, information, and technology can be realized. Neither works alone. Thus, the dialectics of cyborg and gadget, of posthuman and hyperhuman, *constitute the very fabric of American technoculture*.

Furthermore, gadgets are part of a longer tradition in the United States that thinks of technological growth as coterminous with the growth of liberal democracy.[24] Distributing information and expanded consumer choice to individuals through technology, the proliferation of gadgets delivers on a promise offered by American ideologies of technology to empower citizens.[25] But importantly, it is gadgets that help define what individual citizens are. In the inverted sense defined by Slavoj Zizek, where it is the neurotic symptom that in fact structures the self, the gadget is a symptom of American neo-liberal economy and subjectivity.[26] The symptom of the gadget dictates the capabilities and compatibilities of a given personal electronic device, and it structures the necessary conditions of individuality. A personal database is not a personal database because it was created by a particular individual; rather, that individual is an individual *exactly because* s/he participates in the construction and manipulation of personal databases. Likewise, American gadgets are not American because they are manufactured in the U.S. They are American because they contribute to a broader fascination with

individuality, style, and entertainment. It is fitting, then, that the "i" of the iPod, iMac, iPhone, and numerous Apple software applications is merely a lower-case prefix to a self-descriptive title beginning with an upper-case letter. Function inscribes identity, not the other way around. When users try to prove their individuation and solvency as human subjects, gadgets serve as Latourian "actants." Like the parts of a network made up of scientists and things that produce truth, gadgets are helpful evidence that supports individual and national solvency in a wider metaphysical theater of proof, but they constrain the terms of subjectivity to ownership, control, and personal style.

Ultimately, then, no matter what name it bears--cyberculture, posthuman culture, the "digital age"— the growing ubiquity of computational metaphors and their interpenetration with human ontologies have been well-documented by scholars, entrepreneurs, consumers, television, and advertising, as well as American literature and film. I contend throughout this project, however, that consumer electronics have acted as a cultural/technical mechanism through which Americans have preserved traditional axioms of humanity in the face of a posthuman information age, and that the substance of that mechanism is continuous with postwar American fiction. Instead of arguing that human subjectivity, liberal humanity, and Cartesian metaphysics face potential extinction in the face of ubiquitous digital technologies, I analyze consumer electronics' emergence as a popular cultural form that in many ways accommodates all of these problematics. United by the trope of gadgets, both American fiction and consumer technologies produce imagined data-spaces that not only serve as consumer epistemologies of complex systems, but also preserve the concept of human autonomy by conflating personal entertainment with agency, citizenship, and individuality. In the entertainment and style

economy of gadgets, Hollywood and Silicon Valley resemble each other in what they produce, and gadgets expand the purview of both as monuments of American imagination. It is the success of the gadget users in imagining a entertaining, consumerist escape from the posthuman tide that enables U.S. popular culture to retain its longstanding narrative of American exceptionalism. Ultimately, gadgets are not simply technological objects to be examined as representations of certain ideologies in literary texts (though that approach will be helpful); they reveal the continuities between literary production and popular technologies.

One final and important note about the frame for this endeavor: American Gadgets have emerged out of discourses surrounding masculinity and privilege. To say this is not summarily to condemn them as instruments of the hegemonic oppressors or dismiss them as precipitants of capitalism; rather, it is to concede that the archive for this study is often white, male, and upper class. But the gap in scholarship that this project addresses is not one of literary recovery, but the fact that gadgets exist in the first place as a formation found in US technoculture and US literature. In order to do so, I explore the substance and form of gadgets. Because they are crafted of dreams and plastic, fiction and metal, studying gadgets requires analysis of the continuities between "real-world" inventions and technologies imagined in fiction. What follows is a dual format that starts with a discussion of specific technologies and ends with an examination of how the form of gadgets has been influential outside the purview of handheld devices and into questions of style, nationality, and cognition.

The first two chapters examine foundational breakthroughs in materials science that contributed to the growth of personal database technologies as mass technologies.

Chapter one, "Plasticity's Central Canon," examines the continuities between fiction, science fiction, and American imaginations of new technologies. By exploring the history and reception of synthetic plastics in the early twentieth-century United States as an important subtext of *Gravity's Rainbow,* I demonstrate the ways in which consumption of popular technologies and genres of science fiction enable one another as literary and everyday practices. Through a phenomenon called "techno-magic," purveyors and consumers of new technologies both rely on the generic foundations of science fiction in order to transform ignorance of science and engineering into an entertainment effect. Like the magicians who pushed early-modern alchemy, plastics and postwar gadgets made of plastic require a willing audience to uphold the illusion that phenomena that defy lay explanation are fun and desirable, not intimidating or alien. I frame Pynchon's novel as a retelling of the plastics age that both demonstrates the functions of techno-magic and lays bare its generic foundations. Through the plastic Imipolex G, the novel diagrams the uneasy proximity of techno-magic to other cultural attitudes toward new technology that are less concerned with entertainment and more focused on inequities in political, industrial, and scientific power. Thus, Pynchon's novel re-imagines the historical rhetoric of miraculous invention as insidious mystery, and by doing so it explores the boundaries of techno-science and science fiction.

Chapter two, "Recording Literature: Recording, Replication, and the Cybernetic Dialectic," discusses the development of magnetic recording technologies for use as a medium for consumer audio, and the subsequent influence of consumer magnetic recording on the ways in which metaphors of repetition and copying play out in popular understandings of informatics. Where much of posthuman discourse, both scholarly and

popular, has perceived the copies produced by magnetic recording as ushering in a new metaphysic of information that destabilizes ownership and originality, this chapter examines "Recording Literature" as a body of fiction in the United States that attests to the re-inscription of divisions between repetition and recording, between posthuman de-centering of information and the kind of ownership and mastery of information promised by gadgets. Thus, pieces such as William S. Burroughs' *Ticket That Exploded*, Fred Saberhagen's *The Dracula Tape*, and Richard Powers' *Prisoner's Dilemma* demonstrate that management of copies is just as significant a response to magnetic recording as cybernetic destabilizations of ontology. Across their differences, these narratives use the act of recording as a way to construct a personal dataspace that partitions its users from the postwar informatic landscape offered by game theory and cybernetics. Whether it does so through a single cassette (*Dracula Tape*) or a series of complex splicings (*Ticket*) Recording literature explores the use-value of gadgets as a paradigm for managing personal narrative and individual human subjectivities that threaten to crumble at the prospect of infinite copies. The relationship between recording and repetition underscores the unfolding dialectic of posthumanism and gadgets in the postwar United States.

The second half of the dissertation addresses the later twentieth- and early twenty-first centuries, turning to the ways that gadgets operate in literature and culture as both literal mechanisms and broader creative paradigms for organizing imagined futures. The second two chapters draw from the material and cultural foundations of gadgets traced in the first two chapters. Chapter 3, "Chapter 3: Cyberpunk Without Cyborgs: Style and Gadgets in the Early Fiction of Gibson and Stephenson," examines the relationship

among style, identity, and virtual spaces in the cyberpunk fiction of William Gibson and Neal Stephenson. Where traditional readings of cyberpunk often see the blending of humans and computers as the central occasion for the futurescapes and virtual escapades detailed by cyberpunk fiction, gadgets function in Gibson and Stephenson's early writing as a way to imagine the enduring solvency of twentieth-century consumers. In this fiction, it is the hacker's ability to maintain personal control of both his own and other's information that makes up a "cyber style" of poise and individuation that I call "always-adjustment." Using networks as a space for cinematic spectacle, personal space, and techie sprezzatura—as opposed to the community of labor that is ostensibly their raison d'etre—creates the style-effect of cyberpunk computing. In this seminal group of cyberpunk novels that includes *Neuromancer* and *Snow Crash*, human/computer interpenetration is merely cosmetic, and the ubiquity and power of electronics does not change the fundamental metaphysics of liberal consumer style that ultimately amplify, not unsettle, the terms of liberal personhood. Visionary in a different way than gazing toward a posthuman horizon, cyberstyle accelerates and amplifies the rewards of personal style decisions and portrays the survival of core human qualities amidst the depleted and confusing futurescapes of neo-liberal dystopia.

The fourth chapter, "Electronics and Cognition: Gadgets as Cinematic Form," will study how science fiction cinema uses digital video as a metaphor for brain activity, a maneuver that relies on the gadget as an epistemology of information. Starting with the critical conversation about brains as virtual space that Pat Cadigan's *Synners* introduces to cyberpunk and science fiction, I will draw from both cinema studies and the cognitive sciences to discuss generic conventions established by the films that govern the visual

representation of brain activity, rules that perpetuate a specific ideology of brains. In films such as *Minority Report* (2002) and *Paycheck* (2003), digital video displayed on hi-tech displays serves as a way in which characters in the movie can "see" the conscious activity and memories contained within a given brain under examination. The memories and even pre-cognitive activity (*Minority Report*) represented by digital video is not filmed from a subjective viewpoint; there appears to be an assumed cinematographer of the past and future, filming the recalled or foretold events from an objective viewpoint; the memories and thoughts of the video screens comply with the visual vernacular of Hollywood film. This representation through video makes a variety of assumptions about the human brain, including its availability to be "read" by machines and the way in which thoughts and memories are circulated, stored, and recalled in the brain. According to these films, memories exist in file structures analogous to file folders in a desktop computer, and the mind-reading gadgets have found a way to solve one of the most difficult problems in cognitive science today: understanding how activity at the cellular level constitutes experience and consciousness at a cognitive level. In the face of this problem, the tacit assumption of the mind reading technologies is clear: data is data, no matter what the source. Memory, thought, and consciousness (all terms that have been usefully decoupled from one another by cognitive science studies) exist in a single datastream. Thus, the use of video works as a kind of cinematic sleight of hand to shore up the idea that the brain can be accessed or even manipulated like a hard disk. Video is deployed as a naturalized means to show the contents of the brain, and video is data, and data can be therefore recorded and managed. This is a tautological theory of the brain and the ways in which its activity can be represented. Though it would be tempting to say

that this perspective on the brain and data is a posthuman one, I argue that this is anything but the case. At the center of these data streams, commanding their ebb and flow, is the gadget paradigm: recorders, screens, and storage drives working together. The entirety of experience may be collapsible into data (a potentially disruptive realization for traditional subjectivity), but that data is in turn managed and stored by gadgets that are under control of humans (a configuration that restores traditional liberal subjectivity). If such technologies misbehave or threaten to usurp the autonomy of their human masters, they are destroyed in the name of moral righteousness or in the name of preserving what it means to be human. Thus, gadgets emerge as a way to create dystopian worlds that carry within them the latent potential for self-repair.

By tracing the presence, activity, and consequences of gadgets I am not just calling attention to the persistence of older subject positions despite the onslaught of new and emerging American configurations of technology and persons; I demonstrate how gadgets continue to be generative devices for the ways we imagine information and selfhood. While gadgets are by no means a permanent fixture of U.S. culture, their structure and function encapsulate over six decades of American thought about technology and culture after the Second World War. As Presidents now pocket customized Blackberry hardware; as digital devices grow in distribution and shrink in size; as information becomes an aesthetic in popular culture and not just the subject of specialized discourses, and as global networks of information gain new nodes every day, gadgets are more—not less—germane objects of study for those interested in the contemporary and shared stakes of studies in literature, culture, and communications technologies.

CHAPTER 1: "PLASTICITY'S CENTRAL CANON:" GADGETS, SCIENCE FICTION, AND THE WONDERS OF TECHNO-MAGIC

"These new materials are expressive of our own age. They speak in the vernacular of the twentieth century. Theirs is the language of invention, of synthesis. Industrial chemistry today rivals alchemy!"

--Paul Frankl, *Form and Re-Form*, 1930

"[…] an announcement of Plasticity's central canon: that chemists were no longer to be at the mercy of Nature. They could decide now what properties they wanted a molecule to have, and then go ahead and build it."

--Thomas Pynchon, *Gravity's Rainbow*, 1973

"New models of interaction and behavior are the new magic."
--Jim Wicks, VP Motorola, 2007

Proposal: *Gadgets are made of plastic.*

In October of 2007, Motorola VP and Design Director Jim Wicks gave a presentation at the University of Illinois that detailed some of the motivating philosophies behind recent device design at one of the United State's foremost technology corporations. Although he paid consistent attention to the specific technical concerns facing designers in drafting a mobile device's interface and appearance, one statement was particularly noteworthy: "New models of interaction and behavior are the new magic." He repeated the word "magic" time after time in his presentation. The idea of surprise, Wicks explained, the ability of a device to behave in an unexpected but appealing way, was crucial to successful interface and handset design. As the presentation was concluding, he produced a prototype phone made completely of glass and piezoelectric film that looked like a plain, palm-sized piece of clear plastic. He held

it up and touched the front, and the brightly colored interface, complete with numeric keypad appeared where there was once blank glass (this was a prototype of the Motorola ROKR E8).[27] Gasps of astonishment filled the room before everyone fell quiet, demonstrating in practice the "magic" he had discussed moments earlier. After the presentation, dozens lined up to see the device and have Wicks sign their wireless phones.

Wicks' emphasis on a seemingly archaic concept like magic in the field of hi-tech design complicates any linear narrative of technocultural progress when it comes to personal electronics. Magic is "old"; portable wireless media devices are supposed to be "new." The portable media and communications devices Motorola produces certainly could be considered gadgets, but their implication in a concept so venerable poses an interesting question about how to historicize them. Are gadgets as old as magic itself? Or are they first and foremost a specific (and recent) technological development?

The project of historicizing gadgets, therefore, is more complicated than simply going back in history and finding the first handheld database or mechanical novelty. The history of gadgets is not simply a global history of information technologies, nor is the development of gadgets traceable by a history of electronics alone. While a combination of these approaches would make for an effective account of how the world moved from parchment, to books, to radios, to computers as widely available database technologies, a crucial element of what makes gadgets unique as a cultural technology would be left out—namely, the quality of novelty and estrangement that characterizes gadgets cannot be addressed in a historical narrative that treated gadgets as strictly *technological* instead of technocultural developments. The "magic" Wicks speaks of is every bit as much about

an aesthetic of what personal technologies ought to be as it is about progressive developments in semiconductors, memory, and interface. Furthermore, although analogues of gadgets exist in many contexts in many time periods, the specific consumer quality of gadgets is significant: they are either commercialized commodities or metaphorically based on commercialized commodities. With this concept of gadgets in mind, I have chosen to approach a history of gadgets through a *material*, as opposed to a specific device or historical date. My history of gadgets begins with the emergence of the class of materials that enabled the physical, commercial, and imaginative qualities of gadgets; this history begins with plastics. Plastics, a category of industrial materials that is both materially and semiotically flexible, brought about two important developments in the early and middle twentieth century that are now integral to gadgets as we know them. First, there was a great deal of popular amazement with the physical capabilities of plastic, transforming ordinary consumer goods into windows looking upon a utopian future where technology met all the needs of society. Second, the cost and physical properties of plastics made the handheld form factor for personal electronics commercially feasible. In short, plastics are the ideological and material ancestors of contemporary digital gadgets.

In this chapter, I discuss the history of consumer plastics in order to make three connections that are crucial to understanding gadgets both historically and conceptually: 1) the "magic" of contemporary consumer electronics is historically and conceptually derived from the utopian amazement at plastics between World Wars that lived on through portable transistor radios; 2) The portrayal of both gadgets and plastics as magical by their enthusiasts and advertisers is generically similar to patterns of

representing technological novelties in SF; 3) Thomas Pynchon's *Gravity's Rainbow* uses Imipolex G both to recall the generic foundations of the plastics age and to demonstrate the interconnections between genre and technoculture. Importantly, the history of plastics in the United States demonstrates the influence of science fiction and its role in framing technological novelty, both present and anticipated. The novel's treatment of industrial chemistry—centered on a mysterious polymer— invokes this history and inherits its preoccupations. The introduction of an entirely new class of materials into interwar and postwar American and subsequently European consumer culture, named the "plastics age" by historians," generated a great deal of excitement and utopian speculation. When plastics were still relatively new, science journalism and popular science accounts of plastics generically resembled science fiction more than technical reporting. Drawing from this history, Pynchon's vision of plastics is not strictly parodic or mimetic; from the perspective of the early 1970s his version of the plastics age shifts the genre of discourse about plastics from celebratory science fiction to what I will later discuss as "techno-paranormal." Imipolex G calls up and then dismantles the previous utopian rhetoric surrounding new materials through its single most disturbing quality: no one, not even chemists, seems to be able to make full sense of its origins or full physical properties. In compromising the scientific component of science fiction, this plastic demonstrates the instability of the science-fictive foundations of popular technoculture. Rather than embrace the utopian potential of plastics, the novel lays bare its contagious instability. Thus, the novel's Imipolex G—seen in the context of the U.S. plastics age—reworks the complex historical interrelationship of genre, literary production, and American popular technoculture.

I. Techno-magic Defined

Instead of adopting Wicks' vocabulary directly, I will use a more specific term to treat what it was that Wick's was talking about: "techno-magic." Techno-magic is not a contradiction in terms, a paradox of rational and non-rational thought. Instead, techno-magic describes a particular relationship to technology, a specific kind of amazement born out of the productive interaction, not the conflict, between technology and magic as ways of knowing. By introducing the concept of techno-magic, I want to give a more specific name to the substance of the "wow" in Wicks's presentation, to the amazement that accompanies the contemporary use of so many novel consumer technologies. Techno-magic is more than just magic in the classical anthropological sense. It is more than an explanation for a behavior or phenomenon that is not rationally or scientifically understood by a given culture. For techno-magic, the non-rational "wow" is not a metaphysics; it's a choice for the sake of personal entertainment. Techno-magic replaces knowledge about the science, components, and labor necessary for the production and operation of a given device, even though that knowledge exists and those who participate in techno-magic *know* that it exists. No matter how great the audience' amazement during the showcasing of novel technology, then, that amazement is bounded by a tacit assumption that what users see can be explained scientifically right down to the molecular structure of components. In this respect, *science and magic are not antagonistic terms; magic is a consumer experience afforded by technoscience.* For instance, many were astonished at the morphing interface of the ROKR E8, but no one asked for explanations of the basic science behind it. The transmutation of plain glass

into electronic components was more alchemical, in Paul Frankl's sense, than scientific; the spectacle and its implications for future products were more important than the physical processes behind it. The audience enjoyed the performance of the phone's interface, and the science and engineering aspects of the phone were largely relegated to some vaguely understood forces that were powering the show. Like special effects in a film, there was a specific entertainment value in paying more attention to the lights on the screen than to the electronics, materials engineering, and labor behind it.

As Wicks's demonstration suggests, techno-magic contains three key semiotic registers: one of performance, one of provocation, and one of projection. First, techno-magic is a trick performed for a willing audience (as the Wicks example readily demonstrates). Second, techno-magic provokes us to question our assumptions, interrupting standing ideas about what is materially possible (glass should not have been able to paint itself as a phone in the way that it did). Third, in expanding the horizons of possibility, techno-magic projects forward in time the new potentialities that might be made available for upcoming technology: "what if a laptop had the same style of morphing interface?".

To explore these three elements of techno-magic I will discuss theorizations of three concepts that demonstrate crucial facets of techno-magic: special effects, alchemy, and wireless telegraphy. Though techno-magic is not reducible to any one of these concepts, each reveals various elements of technomagic that are conceptually related. Techno-magic is less a singular principle and more an aggregation of related ideas and practices—one part scripted illusion, one part materials synthesis, one part western technoscience. I first discuss Norman Klein's concept of "special effects" as a means to

theorize the relationship between audience and technical illusion in the performative register of techno-magic. After establishing the social and entertainment value of techno-magic through its similarities to special effects, I draw on Pamela Smith's engagement with early modern alchemy to explain the significance of techno-magic as a demonstration and provocation of assumptions about the limits of matter under human influence. Finally, Gavin Weightman's account of Guglielmo Marconi's wireless transmissions in the nineteenth century show how technological novelties can generate excitement about future possibilities, extrapolating about what a subsequent chain of technoscientific developments might bring about in the future, given the innovations of the present.

Norman Klein's *From the Vatican to Vegas* develops the concept of "special effects" as a performed and collaboratory illusion not specific to contemporary cinema. Special effects are a special kind of age-old entertainment in which particular environments and stagings dazzle their audiences with a brand of spectacle that is paradoxically astonishing and comfortable. The key to special effects is that they are both spectacular and scripted; the audience/participants already know the basic outcome according to an implicit script. Explosions may destroy everything on the screen, but audiences know they are safe; casino décor promises to transport patrons to exotic locations, but customers know that they remain in a familiar place; cathedral art and architecture may transport disciples toward the sublime, but the hierarchies of God, Church, and commoner remain intact.[28] In this respect, no matter how great the surprise, the connection between the spectacular illusion and everyday life is a seamless one, because special effects broker power between subjects according to the same logic

as “real life.” This process is collusive. Audiences want to be fooled, and those providing the effects ensure that the illusions are thin enough so that the separation between real and fake can be constantly reinforced. Klein's account diametrically opposes Baudrillard's in this respect, because special effects work to shore up notions of the real, not erode the real into equivalency with themselves.[29] There is nothing "real" about Las Vegas; it is a special scripted space of visual opulence, outlandish architecture, and carnivalesque behavior. It exists as an imagined departure from, not a threat to, the norms of everyday urban existence and behavior. What we learn from Klein's account of special effects as coherent phenomena suggests, then, is that there is a longstanding trend in western culture encouraging audiences to seek astonishment in safe and controlled environments, and that astonishment shores up a realist epistemology. Whether it is a simulated explosion, theatrical presentation, Las Vegas spectacle, or Disneyland, audiences tend to play along even though they know better. Like Alan Liu’s theorization of “cool” in the information age, consumer audiences “crave” the designed forms that mediate between them and information.[30] The most important component to any special effect is the audience’s desire to be fooled and reassured by an entertaining spectacle.

Importantly, the magical novelty of gadgets does not reside in the performance of their features or design alone. The emergence of a new material capability, the invention of a new substance (or at least, the appearance thereof), is just as important to techno-magic as the specifics of its performance. It is to this point that Pamela Smith's study on early modern alchemy is pertinent to the study of contemporary techno-magic. Smith’s work, while primarily concerned with alchemy's use as a metaphor for leadership and

commerce in the Holy Roman Empire, also provides an important discussion of alchemy as a theater of material manipulation. As she explains, alchemy participated in a novel kind of philosophy based on materials and deeds, not words alone. They purveyors of this new philosophy "knew for certain that it had to do with 'things': the collection of things, the observation of things, and material, visual demonstration by use of things in place of the logical demonstration by means of words."[31] Ostensibly, alchemy could transmute baser metals into more valuable ones, accelerating nature's "natural ripening" of metals by specialized techniques.[32] Through human art, then, matter was a site of creation and creativity, not a fixed element of the natural world. Clearly, however, alchemy was not about actually transforming metals (literally changing lead to silver or gold is of course impossible); it was about the spectacle and semiotics of transmutation. Alchemy was public performance and demonstration, and the metal produced was often crafted into a medallion meant to commemorate the transmutation.[33] Yet, although alchemy certainly contributed to the development of modern chemistry, alchemy was not science. Where the successive discipline of chemistry used demonstrations to verify and circulate facts, alchemy used its demonstrations and new metals to produce spectacle and astonishment.[34] But synthesized metals were impressive not only because they were valuable and spectacular, but also because they were tokens of an arcane process whereby humans intervened in the workings of the material world through a secret artistry. Alchemy was performative, but it was provocative as well, exciting the possibilities of human technology by trying to accomplish the impossible.

The old alchemy of centuries past, however, lives on through the new digital gadgets of the twentieth- and twenty-first centuries. Precisely because techno-magic

reconfigures expectations, it always acts as the site for imagined futures. By eliciting surprise and wonder, techno-magic also excites projection forward in time about what may come next. Upsetting terms and assumptions about matter raises questions about what the new terms and assumptions will be, and how the long-term ability to manipulate those terms and assumptions might transform the world. The surprise of techno-magic and any subsequent projections about the future are mutually constituitive of one another. Interruption of old expections and projection of new ones go hand in hand. Marconi's discovery of wireless communication demonstrates their interplay. As Gavin Weightman describes the response to Marconi's breakthrough, immediate discovery or invention is always inflected by the future tense: "But the fact that it was possible at all to establish, by remote control, communication with a ship steaming along at a rate of knots, *even when it was lost to view behind a cliff*, was nothing short of astonishing. The wonders of science, it seemed, would never cease."[35] As with other manifestations of techno-magic, even though very few even dimly understood the science of wireless telegraphy, people worldwide hailed Marconi's discovery as a "wonder of science." Their ignorance of the process actually amplified their delight, making for a moment of amazement when something out of visual range could still be contacted without any physical connection, "*even when it was lost behind a cliff*." Hertzian waves move quite differently than waves of visible light, but few knew that at the time. Crucially, Weightman echoes a common view about the "wonders of science" in his summary of the public reception of Marconi's work, and this cliché discloses the important dual temporality of technologically wrought miracles. Embedded in an overall metanarrative of technoscientific progress, Marconi's breakthrough was more valuable

for what technologies and capabilities it could subsequently engender rather than what it initially accomplished. Patents taken out by both Marconi's and others, acknowledge and perform this anticipatory element of discovery and invention. And years before his famous trans-Atlantic wireless communication in 1902, investors began wooing Marconi in 1897 after he demonstrated the success of his spark transmitter in England.[36] To the continued delight of the consumer and the profit of the entrepreneur alike, the wonders of science never are supposed to cease.

Ultimately, the performance, provocation, and projection of techno-magic raises issues about the relationship between humans and non-humans, what people know about the material world and what the physical laws and limitations of the material world actually are. As an illusion that conceals the science and labor behind the spectacle and an allusion to future possibilities projected from the present performance, techno-magic rewrites both the present and the future. It is a way of exciting possibilities and new configurations within the dynamic of humans, technology, and the physical world, but without the threat of immediate and radical disruption of that dynamic. After all, the imagined futures excited by techno-magic are limited to the terms disclosed and disrupted by the magical event in the first place. The future is invariably imagined in terms of the present.

This tendency is evident in some of the predictive deficiencies of both science writing and science fiction. For instance, a journalist envisioning a future world of synthetic materials based on the techno-magic of the 1940s—industrial plastics—could not foresee oil shortage and pollution as mitigating factors against a utopian future, let alone the decline in number of new plastics in the 1950s. Environmental contingencies

and non-linear development were not part of the techno-magical equation of early 20th century plastics. Similarly, no one at the time of Marconi's discovery could have predicted that the synergy between a not-yet-invented class of materials (plastics) and wireless communication would redefine communications nearly a century later. If techno-magic is never a clear window into the future, it nevertheless always excites thinking towards possible futures—even futures it cannot yet envision. And as we shall see in the following section, the advent of modern plastics was nothing short of a techno-magical miracle for early twentieth-century consumers. The plastics age proliferated an important tradition, combining the promises offered by the western metanarrative of techno-scientific progress, from which techno-magic draws so much of its appeal, with the metanarrative U.S. consumer culture: over time, one can always buy an improved version of a given product. This synergy, this repurposing of techno-magic as an affordable and plentiful commodity, marks the genesis of gadget culture.

Contemporary mobile device design, early modern alchemy, popular conceptions of wireless telegraphy, and special effects in western culture are not equivalent activities, nor are they purely reducible to the practice of "magic." However, the affinities between the categories is instructive, and qualities that one demonstrates explicitly point to more subtle manifestations of the same core ideas in the others. Each establishes analogous arrangements of entertainment, audience, knowledge, and materials. Techno-magic, therefore, is a spectacle executed before a complicit audience that induces wonder and delight at the interruption of the accepted rules of the material world in the twenty-first century. Something is smaller than you expect, or thinner. It behaves in a new way, or does something you thought was impossible before: your music collection in a device the

size of a pack of chewing gum, a screen that responds to human touch, a handset that re-paints is interface dynamically. In each instance of techno-magic, the audience lacks (or disavows) just enough knowledge in order to make the process or object mysterious and entertaining, but the audience also knows just enough to ensure that whatever happens, however surprising, is consonant largely with what they already know about science and/or nature. What they see is either identifiably fake (as in Klein's special effects) or seemingly plausible (the "natural progression" implied by Smith's alchemy)—innovations are always part of a larger meta-narrtive of technosicientific knowledge and progress. The crux of techno-magic, therefore, is not that it is *super*natural; that would be alarming, not appealing. Techno-magic is ultranatural instead, reaffirming technology as a means to unlock and exploit the secrets of the so-called natural world. As the entertaining side of empiricism, techno-magic respects the universe and epistemology that creates the rules of matter while presenting novelty; though it has the capacity to transform social conventions of realism—what was once amazing can become a new status quo—it never destroys them outright but instead redefines them.

At base, these aspects of techno-magic rely on two interconnected desires: a desire to be entertained/fooled, and a desire to manipulate/accumulate material resources. One desire centers around performance, oriented primarily toward amazement, entertainment, and surprise as described by Klein and Liu. The other is alchemical, fascinated with manipulating matter and speculating on the possibility of the unlimited wealth—technological, monetary, or otherwise— promised by human sovereignty over the physical universe. Like Deleuze and Guattari's formulation of desire, this alchemical desire is constructive. It creates a reality made of products and potential products,

articulating present synthesis with the limitless prospects of a future not yet decided.[37] The fruits of alchemy are largely anticipatory, for one gold ingot was and never will be enough. Instead, the gold—and the process that rendered it—is merely a metonymy of the untapped riches to come. The performance of alchemy, whether it turns lead into gold or petroleum waste into the fabric of utopia, accomplishes two things: it shows off that technoscience is capable of such a feat, and it promotes a vision of endless production of riches. Techno-magic, therefore, is a specific configuration of time, technology, and materials produced by/during the desire for both spectacle and alchemy. It is in this context that *Gravity's Rainbow* is crucial to a study of techno-magic and plastics. Simply put, Pynchon's rendition of Imipolex G in makes explicit what the plastics age and so many subsequent years of invention and speculation approach in their rhetoric but rarely state outright: the products of techno-magic are not just desirable, they are desires congealed into physical substance.

II. Early Industrial Plastics: Magic and Utopia

From the vantage point of the 21st century, it would be easy to say that the history of gadgets began with Walkmans or even transistorized radios. Both were, arguably, the first examples of technologies that allowed for local and private control of information; were portable and appealed to a personalized sense of style and ownership and were widely available on the commercial market in multiple models from which to choose. Gadgets, as I have argued, are first and foremost technologies of the imagination. But just as the first gadgets were not in the earliest personal database technologies (this slippery slope would lead us all the way back to papyrus) gadgets also did not owe their

genesis strictly to narratives either. And the birth of the first gadget was not the first time a speculative narrative imagined a new and fantastic technology. Instead, the first gadgets emerged with the idea that everyone could own said new and fantastic technology. As the following overview of plastics in the early 20th century suggests, the first affordable-shatter resistant tumblers, brightly colored laminates, and pocket-sized transistor radios were crucial components of the phenomenon of gadgets because of both their demonstration of techno-magic and their general availability. These objects generated so much speculation and excitement that they appeared at once present and prescient, concrete and fantastic, a piece of the present and a piece of some imagined, engineered tomorrow. When this quality of techno-magic becomes something that individual consumers buy, possess, touch, and show off, when amazement and alchemy are no longer rarities that one has to travel to see at the arena, theater, or cinema, when they no longer exist exclusively in large-scale civic technologies like the telegraph, locomotive, or power plant, these conditions enable the birth of the gadget as a *personal* database technology.

As several historians have pointed out, contemporary scholars and laypeople alike have difficulty understanding the genuine excitement surrounding industrial plastics during their advent between world wars in the United States. Within recent decades, plastic has acquired a reputation for cheapness and low quality. The idea that plastic could be an exciting substance, one that offered new possibilities instead of frustrating limitations, is as alien to contemporary consumers as the buzz surrounding the invention of nylon stockings.[38] But when the first consumer plastics became available before World War II, there was no shortage of enthusiasm for the synthetic materials

manufactured by industrial chemistry. The industrial alchemy provided a powerful means to elevate plastics into the status of miracle material. Though this moment passed after World War II, the material and imaginative legacies of the interwar plastics age continued. Plastics composed the housings and internal components of the new handheld consumer-grade electronics, materially enabling the most prominent instantiation of the gadget metaphor over the last 100 years. At their advents, popular industrial synthetics and gadgets were made of the same stuff: magic and plastic.

The first plastics, though unglamorous, laid the groundwork for more millenarian attitudes that followed. Now termed "natural plastics," the oldest plastics were made of organic substances that were heated and pressed into molds. In the United States, natural plastics like amber, horn, and shellac were familiar and in circulation at the end of the nineteenth-century, but short supply of these materials made them expensive commodities and by no means general consumer goods.[39] The first semi-synthetic plastics (natural materials with components added under controlled conditions) appeared around the middle of the 19th century, with one of the most notable examples being vulcanized rubber, a hardened adaptation that was useful for jewelry manufacture and other industrial applications.[40] By the late-nineteenth century, natural and semi-synthetic plastics were employed for a variety of purposes ranging from simple ornamental objects such as picture frames to more practical items like dentures and rubber tires.[41] Of all the early plastics, by far the most influential for western civilization was celluloid, a semi-synthetic crafted from a nitrocellulose solution and camphor. According to Susan Mossman, celluloid's initial form was pioneered in 1862 by Alexander Parkes in Britain. Parkes coined his new material Parkesine, which combined nitric acid, sulphuric acid,

and cellulose from cotton fibers into a workable dough that hardened over time.[42] Parkesine and its early successors, including Xylonite and Ivoride, were primarily used as imitations of natural materials for decorative objects, but a variety of obstacles, including an unreliable production process, ultimately doomed any successful commercialization efforts.[43]

It wasn't until the 1870s that American inventor John Wesley Hyatt tweaked the chemical and molding procedures in order to synthesize a stable and popular form that would come to be known as celluloid.[44] Like the previous incarnations of nitrocellulose plastic, celluloid's most predominant use was as an imitative substance.[45] Hyatt began his experiments with plastic by developing a substitute for ivory in billiard balls, and by the early 20th century, celluloid was used as a common substitute for gemstones, ivory, horn, and even wood.[46] As historian Jeffrey Meikle points out, the first commercially successful plastic was initially supposed to be more of a low-cost substitute for materials that already existed rather than a completely new horizon for material innovation.[47] But the semiotics and expectations of plastic changed in the successive decades. By the late 1920s, DuPont was promoting its Pyralin nitrocellulose plastic as a fantastic new material, not an imitative substance with a 50-year history of pinch hitting for more expensive natural substances. Meikle identifies and discusses this important transition: "In this new corporate strategy celluloid no longer owed its definition to its end use as a substitute for natural materials […] a fact that liberated Du Pont to emphasize celluloid's innovative potential as a 'chemical product which science has developed and perfected' […] 'a wonderful material, the product of American cotton fields and chemical plants.'"[48] Plastic was not only materially flexible, but its semiotics contained a great range of

potential as well. Because it could take seemingly any shape and displayed properties unheard of before, plastic became a nexus for the imagination of technological progress and an alchemical proliferation of resources. Plastics for the popular consumer were one part science, one part manufacturing, and one part pure fantasy. If machines could mold it into a variety of shapes, and if industrial chemistry seemed to be able to adapt its physical properties as if by conjuration, then promoters of plastic saw no limit as to what the new material could accomplish. Plastics were simultaneously a modern miracle and thesubstance with which you combed your hair. This utopian turn toward the vast potential of plastics marked the beginning of the interwar plastics age, although one whose sensibilities and excitement would last only a few decades.

If plastic in the last decades of the nineteenth century was an imitative curiosity, it became the substance of utopia in the years between World Wars in the United States. Several scholars have called attention to this moment in the history of plastics, characterized by a fascination with its new physical properties and potential applications. It was clear that plastics would transform and were already transforming everyday life for millions of consumers in the 30s and 40s, but the question was exactly how that change would look in the long term. As a result, many accounts of plastic from the interwar period have an anticipatory quality that makes their writing seem more like science fiction than journalism. Throughout this period of what Jeffrey Meikle aptly calls "plastics utopianism," technomagic is pervasive as a hermeneutic through which laypeople encountered and processed these versatile products of industrial chemistry. Although scholars agree that after World War II plastic lost its appeal and acquired the valance of shoddy quality and superficiality that characterize it for many decades after in

the U.S., the partial continuity of a subtler version of plastics utopianism through the following decades is crucial to the history of gadgets. Through an examination of plastic transistor radios, I will trace this continuity of techno-magic in the decades following plastic's heyday.

In this so-called "plastics age" new developments in plastic and enthusiastic designers and consumers created a positive feedback loop that fed the excitement about plastic with each novelty. Meikle, one of the most authoritative historians of plastic, discusses plastic utopianism as the belief in "plastic's utopian potential as a substance capable of transforming the material conditions that had always limited human life."[49] Among the countries that were early developers and adopters of plastics—the United States, Great Britain, and Western Europe—the U.S. was the first to buy into this faith in the new synthetic materials.[50] Between 1920 and 1945, this point of view gained momentum with the advent of plastics like cellulose acetate (brand named "Lumarith") and urea formadehyde ("branded as Beetle"), improvements over the earlier materials of celluloid and Bakelite, respectively.[51] While celluloid and Bakelite had been influential in their own rights, both materials were mainly limited to a palette of dark, muddy colors.[52] The newer plastics, however, were available in an impressive rainbow of colors, expanding the possibilities for designers, manufacturers, and consumers.[53] Most importantly, this new suite of possibilities appealed to consumers because bright and stimulating colors were seldom affordable, if not impossible to attain, in non-plastic consumer goods made of wood, steel, ivory, horn, and even gemstones. Significantly, the cost of plastics continued to drop throughout the interwar period as factories streamlined their manufacturing, tweaked their chemistry, and flooded the market with a variety of

colorful and versatile materials, allowing manufacturers to cut costs, and, at the same time, redesign their products to be more attractive.[54] It is no wonder, then, that utopian sentiments about plastic were prevalent; plastics were improving the quality of everyday life for consumers, fueling speculation about what they were capable of doing next. Despite this wave of excitement and prosperity, Meikle, Claire Catterall, and Penny Sparke all note that the U.S. era of plastic utopia ended shortly after World War II, whereupon Great Britain and later continental Europe took their respective turns at euphoria for plastic. Meikle describes the U.S. attitude toward plastic in the post war years: "Whatever its usefulness to human life and comfort, plastics in the immediate post-war era inspired no vision greater than dampcloth utopianism [being able to clean synthetics easily]."[55] Certainly today plastics do not necessarily carry any specific valance, utopian or otherwise, because they have become naturalized as part of everyday life.[56]

Yet while it lasted, plastics utopianism was filled with the language and logic of techno-magic. Designer Paul Frankl, author of the interior design text, *Form and Re-form* (1930), says of the new industrial plastics: "These new materials are expressive of our own age. They speak in the vernacular of the twentieth century. Theirs is the language of invention, of synthesis. Industrial chemistry today rivals alchemy!"[57] Edwin Slosson, director of the Science News Service in 1921, purposefully used, in his own words, "sensational" language when writing to the broader public about the virtues of industrial chemistry and plastic.[58] In his 1920 book, *Creative Chemistry*, Slosson compares industrial chemists to alchemists, because like alchemists, they hold aspirations (and now, the genuine means) to bring about "the formation of something new." The new plastics

are part of a "supernatural machinery" that allows humankind to conquer nature.[59] In his discussion of celluloid, Slosson's writing exudes palpable excitement at the miraculous versatility of the new protean material: "So celluloid and its congeners are not confined […] but can be given forms and textures and tints that were never known before 1869."[60] He continues with an effusive list of possibilities that borders on prose poetry: "have I mentioned all the uses of celluloid? Oh, no, there are handles for canes, umbrellas, mirrors and brushes, knives, whistles, toys, blown animals […] pool balls, ping pong balls, piano keys, dental plates, masks for disfigured faces, penholders, eyeglasses frames, goggles, playing cards—and you can carry on the list as far as you like."[61] Slosson's rhetoric takes his reader on a tour of expensive items made affordable by plastic, items that can accommodate the simplest of needs to the most personal of prosthetic modifications. His delight does not stem only from the new options available to human makers, but is deeply rooted in the fact that possibilities emerge from a single family of substances. Thrust into the limelight by this kind of popularizing rhetoric, the industrial chemist takes on the aura of the alchemist.

Written 24 years later, Burr Leyson's *Plastics and the World of Tomorrow* (1944), encourages readers to experience a similar astonishment at plastic's versatility and amazing properties: "Strange as it may seem, glass fibers, as thin as thread and as flexible, can be woven into fabric, and when this fabric is bonded by a plastic the result is startling. Colors of every hue are possible, and the sheen of the fabric is unmatched. In addition, it is spot-proof and possesses wearing qualities far beyond anything now in general use."[62] While Leyson makes no explicit comparison to magicians or alchemists, the logic of magic, the basic fascination with an object or substance that seems to change

the rules of what material is capable of, pervades his descriptions. The new laws of matter become more spectacular when articulated in this sensational rhetoric: "Scientists juggle the atoms almost at will, forming this substance or that and knowing what the characteristics will be."[63] Instead of an invisible and largely unknown scale of existence, the atomic level of matter now behaves like the phenomenologically experienced world, where hands-on "juggling" and a comforting level of predictability and control obtain. Impressed by the new materials and painting its creators as astounding manipulators with newfound powers, he articulates the formal qualities of alchemical transmutation even though he never invokes specific comparisons to stock mystical figures. His book is a showcase of the production, purpose, and potential of various plastics. While Leyson's approach somewhat resembles his strategies in his technically-centered books such as *Aeronautical Occupations, Flight Training for the Army and Navy, The War Plane and How it Works,* and *Elements of Mechanics*,[64] the tone of *Plastics and the World of Tomorrow* is clearly more anticipatory. Nearly every chapter concludes with speculations about potential breakthroughs in engineering and material science. Plastic, it seems, is a different kind of topic for Leyson. He does not just catalogue the existing plastics industry or tell his readers "*How it Works*"; he celebrates the prospects of a new kind of world created from a new kind matter.

Other examples of magic as a constituitive metaphor for understanding plastic abound, including the famously hyberbolic V.E. Yarsley and E.G. Couzens' *Plastics,* a text that all but promises a utopian world based on the amazing properties of industrial synthetics. Though the authors were British, their 1941 text demonstrates an enthusiasm that is more American than European, for while Americans were looking forward to

utopia, British opinions of plastic in the early and mid '40s tended toward suspicion of the mass productions of the United States.[65] In his conclusion, Yarsley envisions that plastic will create "a world in which man, like a magician, makes what he wants for almost every need, out of what is beneath him and around him, coal, water and air."[66] Like Leyson, Slosson, and Frankl, Yarsley is fascinated by the new possibilities for human technology and matter that plastic introduces. He describes plastic as nothing short of techno-magic, a perpetually receding horizon of desire. Surprise and amazement in the present meant continual progress and satisfaction in the future. Consumerist desire and technoscientific development came together in an affordable package. Through plastic, nearly anyone can buy a piece of the future.

But this history of plastic in the United States is not simply a matter of excitement firing up and then dying out. While Meikle's study focuses specifically on a short-lived "plastics utopia" and serves as a complete history of plastics during that period (he examines specimens ranging from features in *Forbes* magazine to the rhetoric in trade journals), my focus on the significance of techno-magic extends his account. In this regard, the distinction between utopianism and magic is crucial; scholars agree that the utopian attitude toward plastic ended shortly after World War II, but the magic of plastics, a phenomenon that helped drive the utopianism Meikle identifies, did not wear off as quickly. Just as soon as plastics cease appealing to the public as the building blocks of a better world, the budding fields of industrial design and portable electronics took off as ways to transform the technologies of the plastics age. The physical properties of plastic were no longer magical on their own, and as Yearsley reviews his previous speculations with disappointment, he suggests as much in his later writings, *Plastics in*

the Service of Man (1956): "Is there any more room for new products [new kinds of plastic]? Informed opinion is unanimous that, albeit all the possible chemical permutations have not been exhausted, it is unlikely that important plastics new to science will be discovered and brought into commercial production in the near future."[67] Once polemically excited about plastics, Yarsley admits that their time of absolute novelty has ended. But in his words, the emphasis shifts from development of novel substances to combining multiple materials together and fostering "good design and end products."[68] Importantly, the new shapes and colors plastics could take and the novel form factors they enabled became new sites of amazement through innovative designs. If products weren't actually made of radically novel materials, their size, form factor, and overall design could be combined to produce the illusion of a new and surprising substance. After plastic helped techno-magic become an affordable commercial substance between wars, the consumer magic of the interwar period lived on through the postwar era of consumer electronics housed and sculpted by plastics.

III. The Transistor Radio

No other area of products in the postwar years exhibits this nexus of magic, design, and electronics quite like handheld transistor radios. Starting with the TR-1, the first widely distributed transistorized electronic gadget, the transistor radio appeared on shelves as the first pocket-sized electronic communications device in 1954.[69] With tinny sound and an intimidating price of $49.99 (approximately $380.00 in 2007) the TR-1 did not achieve any significant commercial success.[70] However, the transistor radio quickly took off in popularity, making up for 41 percent of radio set sales in 1959, with many of

that number being portable sets.[71] Pocket-sized radios gained popularity as sound quality, battery life, and overall durability improved. With each of these improvements, the cost of each individual set fell sharply, until in the 1960s, a shirt pocket radio cost an average of a few hours earnings.[72] In the late 50s and 60s American and Japanese sets appeared in a variety of shapes and colors. The TR-1 was originally available in 4 different colors and later expanded to more than 10, but the array of design choices available to consumers in the later 50s and early 60s was staggering.[73] As Michael Brian Schiffer notes of the Japanese imports, "As a group, the Japanese radios of the late fifties and early sixties were rather pleasing to the eye with their graceful lines and lively colors. Without doubt, this was the golden age of the transistor pocket portable."[74] In their showcase of Japanese portables, *Made in Japan,* Roger Handy, Maureen Erbe, and Aileen Antonier extol the "aesthetic glories" of this period of device design.[75] Americans bought devices that imitated automotive and architectural icons of the time, as well designs for spacecraft, satellites, and UFOs. Consumers and collectors alike, they maintain, experienced and continue to experience "surprise" and "delight" in their presence.[76] By the time the 60s were over, buyers had taken home 27 million transistorized sets since their commercial introduction.[77] This figure marked a tremendous increase in popularity for portable transistor sets; in its first year of sales, the debut of the TR-1 had moved only 100,000 units.[78]

As Schiffer points out in *The Portable Radio in American Life*, the full story of the transistorized radio spans several decades, industries, and continents. But from the fascinating tangle of influences that made the pocket-sized portable as popular and successful as it was, I would like to emphasize that while the novelty of the pocket-sized

portable lasted, tremendous excitement surrounded its appearance and size. Advertisements referred to miniature radios as "miracles."[79] One advertisement for a Transi-Mite Radio Lab set even refers to its product as "a gem of electronic magic."[80] Also, both Schiffer and Handy et al. agree that one of the most important factors in the portable radio's success was the rise of rock and roll music and a younger generation of listeners who had access to disposable income and demanded a personal listening space away from a disapproving older generation.[81] The pocket-sized form factor, reduced weight, and introduction of headphones made available a new genre of personal entertainment. Listening to the radio was no longer a family or household entertainment; smaller and portable sets allowed for new and individual listening practices.

In short, plastics made an unmistakable imprint on the advent of transistorized consumer electronics. Lightweight, affordable, and visually striking products would not have been possible using conventional materials such as wood or steel. If, as Meikle observed, about industrial design and plastics in the thirties, "the relationship between the plastics industry and design was symbiotic," then the same held true in the fifties and sixties.[82] Although transistors were certainly a significant breakthrough in electronics, the visual appeal and form factors of postwar electronics still relied on the material breakthroughs of plastics. Plastics provided many of the insulating materials needed to produce lightweight circuit boards. Therefore, plastics acted as a catalyst to the productive interaction of novel product design, personal style, portability, affordability, and techno-magic. When traced historically, these categories begin to blend into one another: Plastics made entertainment portable; plastics made entertainment personal.

But, like the plastics introduced during the interwar period, transistor pocket radios lost their position as a focal point of imagination, fascination, and novelty.[83] While they continued to grow more and more affordable, their designs lost variety and excitement as radios, like the first synthetic plastic commodities of the twenties, thirties, and forties, became increasingly mundane. Although part of the appeal of both plastics and plastic radios was their availability to the common consumer, transistorized pocket sets had paradoxically became too commonplace to be amazing. With the release of the Philips compact cassette in 1963, consumer audio took a new direction as storing custom collections of music became easier and less expensive. And after the Sony Walkman debuted in Japan in 1979, portable audio turned toward a now familiar genealogy of music players based on local data storage. As relics of the past, transistorized pocket sets stand for a nostalgia surrounding the birth of rock and roll, personalized listening, and postwar industrial design in the United States, Europe, and Japan. However, they also index an important transfer of the phenomenon of techno-magic from the interwar period of plastic housewares to the realm of contemporary electronics.

In their prime, plastics were magical in the eyes of many writers and consumers. But just as plastic appeared to offer a nexus of possibilities in non-fiction documents written by chemists, designers, and journalists, it also occupies an analagous role in Thomas Pynchon's *Gravity's Rainbow*. Plastics' appearance in both non-fiction and fiction as a magical substance not only speaks to the prevalence of techno-magic, but also demonstrates the ways in which plastics exist between reality and fiction. Given this point, plastics can enable a conversation about the ways in which a category of devices such as gadgets can redefine contemporary sensibilities of reality, fiction, and science

fiction. In their novelty, plastics and gadgets act as disruptive and generative forces. The study of novel technologies is just as valuable to new understandings of science fiction as the study of science fiction is to the historicization and analysis of novel technologies.

IV. Gravity's Rainbow and Plastics

One of the most prominent features of *Gravity's Rainbow* is that it offers a dense matrix of technological data, much of it daunting to literary critics. In response to this encyclopedic approach, much of the criticism on the novel is quick to point out that, like many of Pynchon's other works, the novel presents a vision of science as "systematic:" a dogmatic and totalizing system of organizing the material world into predictable and knowable systems. Earlier criticism of the novel in the 1980s, such as Molly Hite's *Ideas of Order in the Novels of Thomas Pynchon*, demonstrate the importance of systems to the overall thematic agenda of the novel. Engaging previous observations about order and control in Pynchon's work, Hite describes a fundamental ambivalence toward systems in *Gravity's Rainbow*: "[the novel] offers a vision of perfect control and then generates its energy—and its humor—from a refusal to pledge allegiance to that vision"(100). More recent criticism tends to portray Pynchon's vision of science as a hermetically sealed, totalizing system through which everything in the world may be explained. From Margaret Lynd's "closed system of science"(69) to Luc Herman and Petrus van Ewijk's more dialectical conception of *Gravity's Rainbow* as an encyclopedic text that simultaneously feels comprehensive yet cannot be, critics commonly draw on this monolithic view of Pynchon's techno-scientific systems in their critical discussions of his work.[84] Bruno Arich Gerz argues that the use of mathematics and science often structures

the literary narrative of *Gravity's Rainbow* itself, establishing the centrality of empiricism as Pynchon's epistemological and narrative lens.[85] Even Meikle, in a later chapter on plastics, offers a similar approach to the novel. His study as a historian emphasizes that "Pynchon simulates the language of innumerable twentieth century points of view, including the plastics utopianism of such works as Slosson's *Creative Chemistry*," but uses this historical frame to conclude "Synthetic chemistry […] provides Pynchon with a metaphor of the twentieth century's organization of human beings into deadening economic and bureaucratic structures"(*American Plastic* 294).

While I am not discounting their validity, these critical approaches do not fully account for the significance of Pynchon's fictional plastic.[86] When it comes to describing industrial plastics, *Gravity's Rainbow* does not rehash the plastics age or deploy science and technology as systems of order in the service of various ideologies or critiques: the novel recalls the plastics age only to dismantle its visionary conflation of science fiction and science. Understanding techno-magic and its relationship to the plastics age helps us to understand its transformation in the novel through Imipolex G. Imipolex G replaces techno-magic with what I call "techno-paranormal" as the primary means to organize knowledge about industrial chemistry. Where techno-magic locates specific scientific knowledge in a community of specialists while simultaneously celebrating the entertainment effect brought about by consumer ignorance, the techno-paranormal defamiliarizes technological novelty by erasing certainty about, in this case, the composition and manufacture of plastics.

Gravity's Rainbow participates in the legacy of the plastics age not only in restructuring the past, but also in rearticulating one of its central tenets: new substances

transform humanity's relationship to the material world and serve as objects of desire as well as means of scientific control. Early in the novel, Pynchon parodies the rhetoric of the plastics age in the late Walter Rathenau's address to the IG Farben leadership from beyond the grave:

> If you want the truth—I know I presume—you must look into the technology of these matters. Even into the hearts of certain molecules—it is they after all which dictate temperatures, rates of flow, costs, profits, and shapes of towers…You must ask yourself two questions. First, what is the real nature of synthesis? And then: what is the real nature of control?(Pynchon 168-169).[87]

The substance and motion of the world, from molecules, to economics, to architecture, are knit together in a single-minded vision that locates ultimate human power in the laboratory of the industrial chemist. Synthetics do not just stand for scientific progress; they are the means by which humans transform the world through the exercise of totalizing systems of knowledge. Yet while this account may seem to support Meikle's claim that the novel expresses the same celebratory utopianism of the plastics age, it is important to consider that a ghost speaks these words through a medium, and an end product of such careful and systematic transformations is Imipolex G—a substance that, by its seemingly unlimited potential, defies explanation by the very means that supposedly created it.

Rather than a predictable substance produced by a totalizing empirical science, Imipolex G behaves (and evolves) like no other material. It is with Imipolex G that

Pynchon's science demonstrates its divorce from science fiction, for the utopian and speculative impulses of techno-magic no longer obtain. With this plastic, the imagination of the paranormal supplements and reframes technical discourse instead of the science fiction of the Plastics Age. The novel introduces this remarkable plastic in what appears to be a brief report outlining its core capabilities and chemical structure: "Imipolex G has proved to be nothing more—or less—sinister than a new plastic, an aromatic heterocyclic polymer, developed in 1939, years before its time […]"(Pynchon 252). Like many plastics, Imipolex G's ultimate value is a matter of speculation, "nothing more—or less." Imipolex G may be a synthetic material born out of a long line of German synthetics, but exists as something sinister and more remarkable than other thermoplastics. The physical description that continues the narrator's preliminary entry on the plastic removes any doubts about its extraordinary status: "It is stable at high temperatures, like up to 900 C., it combines good strength with a low power-loss factor. Structurally, it is a stiffened chain of aromatic rings, hexagons like the gold one that slides and taps above Hilary Bounce's Navel […]"(Pynchon 252). That Imipolex G remains stable at around 1650 degrees Fahrenheit at a time when any plastic that remained stable when boiled was considered a success indicates exactly how exceptional this imagined plastic is. As the product of a succession of research breakthroughs that includes nylon, Imipolex G's aromatic structure is the next step in announcing "Plasticity's central canon: that chemists were no longer to be at the mercy of Nature"(Pynchon 253). Here, Pynchon invokes the work and rhetoric of the DuPont researcher Wallace Carothers, referred to in the novel as "The Great Synthesist," as well as the broader utopias promised by so many enthusiasts of the interwar plastics age (348).[88]

But the narrator does not stop there, disclosing the imaginative rather than technical core of Imipolex G's arrival on the scene of twentieth-century thermoplastics. Leading up to the advent of Imipolex, the words "Strength, Stability, and Whiteness," referred to as "Plasticity's virtuous triad," appear throughout Germany like a ghostly mantra, "[mis]taken for Nazi Graffitti"(Pynchon 253). This association of Nazism and industrial chemistry suggests that plastics embody a set of ideals that transcend the space of the laboratory and take as their antecedent cultural and national imaginations of a utopian (albeit fascist) future. Furthermore, the reader learns in subsequent testimony that the development of Imipolex G came directly from a "hypothetical chain" of heterocyclic and aromatic rings of atoms, but there is no explanation of how chemists adapted the hypothetical structure into Imipolex G. This omission stands out in the aftermath of a flood of technical terms, though these terms are never combined into a coherent scientific explanation. The narrator gives a glimmer of a rational explanation for how ordinary plastics are built from the molecular level, but how those chemical structures can be modified to become Imipolex G is and remains a mystery. Like other synthetics developed during the mid twentieth-century, Imipolex G embodies not just a specific chemical innovation but also a rapt fascination with the transformative potential of synthetics to achieve utopian ideals in excess of purely scientific advancement. Unlike other synthetics developed during the mid-twentieth century, however, the exact chemical structure and full range of physical properties of Imipolex G always seem to exist somewhere between the hypothetical and the fantastic. By focusing on Imipolex G's remarkable physical properties but occluding the scientific explanation for their

existence, the novel ensures that the most important aspect of Imipolex G remains its imagined uses, not its present or past applications.

But as remarkable as it is physically, Imipolex G encompasses more than unidentified chemicals and utopian speculation. A peculiar sensuality surrounds this plastic as an object of desire, granting it a mysterious sexual charge and profound magic-effect that defies empirical explanation. Scientific achievement is sexy, but the appeal of Imipolex G is singularly intense. That the shape of its aromatic rings is compared to the piece of jewelry that "slides and taps above Hilary Bounce's navel" not only associates Imipolex G with sensual human flesh, but also transforms molecular synthesis into an eroticized realm of elegant forms. While the idea of a sexually stimulating molecular composition appears to be a paradox (one cannot touch individual molecules or view aromatic rings with the naked eye), *Gravity's Rainbow* sustains a consistent sexual valence around Imipolex G both as a substance and a molecular anomaly. The existence of a molecular structure that is both unknowable to the senses and not fully known by the chemical science imbues the substance with exciting mystery and power. How the molecular composition of Imipolex G creates a sexual plastic is left unexplained, but its effect is undeniable. During Greta's first encounter with Imipolex G in Blicero's molding facility, she describes Drohne's sexual arousal as he demonstrates his knowledge of specific plastics and their chemical compositions:

> Drohne's hand was sweating on my sleeve. He was a plastics connoisseur. Flipping his fingernail against a large clear African mask, cocking his ear—"Can you hear it? The true ring of Polystyrene…' and going into raptures for me over a

> heavy chalice of methyl methacrylate […] Clear rods of some plastic came hissing out through an extruder at the bottom of the tower, into cooling channels, or into a chopper. The heat was heavy in the room […] Plastic serpents crawled endlessly from left to right. The erections of my escort tried to crawl out the openings in their clothes. I could do whatever I wanted […] I knelt and began unbuttoning Drohne's trousers (Pynchon 495).

From their molecular make-up to their tactile properties, plastics excite Drohne. He touches and listens to them, relishes their names, calls them by not only their brand designations (Polystyrene), but also their specific chemical names (methyl methacrylate). He goes into "raptures" when explaining plastics to Greta. As she detects his arousal increasing from the initial sweaty hand on her sleeve, her account maps his sexual excitement onto the activity of the molding equipment around him. The heat of the place, the rod shapes produced by the extruder, the crawling of the "plastic serpents" as the cut pieces move along—each of these elements makes plastic not just the object of sexual fascination, but the subject as well. When the moment culminates with "the erections of my escort tried to crawl out of the openings in their clothes," Greta refers both to Drohne's genitals and to the cut cylinders of Imipolex G around them. And when she begins to unbutton Drohne's pants, it is evident that she too is aroused, but for different reasons. Drohne is an expert and lusts after all plastics and, as a connoisseur, finds their chemistry sensual; Greta is compelled by something specific about this place and the substance it produces, this assembly site for the S-Gerat, "something very deep, black and viscous"(Pynchon 495). Imipolex G excites her like no other substance.

But the sensuality of Imipolex G goes beyond its status as a techno-industrial fetish; more than just a passive object of human fascination, it has the unsettling capacity to provoke sexual stimulation as well. Soon after the moment by the molding machine, when clothed in an Imipolex G costume, Greta encounters this dimension of Blicero's pet polymer. While Drohne delivers the familiar millenarian rhetoric of the plastics age as he reveals her new garment—"Forget leather, forget satin […] This is Imipolex, the material of the future"—Greta has a much more visceral reaction to the substance: "It felt alive against my skin […] I can't describe its perfume, or how it felt—the luxury. The moment it touched them it brought my nipples swollen and begging to be bitten. I wanted to feel it against my cunt. Nothing I ever wore, before or since, aroused me quite as much as Imipolex"(Pynchon 496). Imipolex G is fascinating not simply because of its chemical structure, but because of its erotic ability to excite the senses. From its insinuating smell to its electric touch, Imipolex G immerses Greta in a sensual utopia. The smell is "luxury," the texture overwhelms her and fills her with desire, and she later describes Drohne's strap-on Imipolex G penis as "delicious." As an extension of plastics utopianism, Pynchon's plastic does not just promise to be "the material of the future," it has gone another fantastic step: it completely fulfills one's bodily desires. With its aggressive sexual stimulation, alien reactivity, and unique texture, Imipolex G not only breaks the rules of what a synthetic material is capable of, but also what any non-living thing is capable of. Though inanimate, Imipolex G assumes a life of its own.

Subsequent revelations about Imipolex G reveal its status as a material that both re-writes scientific expectations about matter and poses an insoluble mystery to chemists.

Toward the end of the novel, the narrator provides a subsection entitled "Some Characteristics of Imipolex G:"

> Imipolex G is the first plastic that is actually *erectile*. Under suitable stimuli, the chains grow cross-links, which stiffen the molecule and increase intermolecular attraction so that this Peculiar Polymer runs far outside the known phase diagrams, from limp rubbery amorphous to amazing perfect tesselation, hardness, brilliant transparency, high resistance to temperature, weather, vacuum, shock of any kind (Pynchon 713).

That this section is called "Some Characteristics" understates exactly how remarkable this polymer is—apparently there are even more aspects of this substance about which the reader will never learn. In this passage, there are two kinds of surprises taking place. The first is the incredible power of this plastic to change its molecular structure radically and dynamically. Imipolex G's unusually high resistance to heat and shock characterizes only one of its potential states. Its other available state (that we know of) possesses remarkably protean abilities, "limp, rubbery, amorphous." In this regard, Imipolex G has all of plastic's historically recognized strengths, but none of its weaknesses. It is strong, but not brittle, flexible, but strong. Its molded state is only temporary if need be, depending on the job at hand. Chemically speaking, Imipolex G is *more plastic* than plastic.[89] A synthetic plastic that somehow shifts between amorphous and hardened states indicates a more profound dimension of human control over matter than even the plastics

utopianists and sensationalizing chemists imagined in the thirties and forties; Imipolex G marks a new horizon of the laws defining the physical universe.

As a manifestation of the unbridled popular sexuality and potential of The Zone and Blicero's private and oppressive sado/masochism, Imipolex G's physical properties are complex, mysterious, and decidedly sexual. Because it is described as an "erectile" substance that reacts "under suitable stimuli," Imipolex G displays an anthropomorphic sexuality. There is something sinister, subtle, and fateful about its reactivity, evidenced by subsequent descriptions in the same subsection: "Its own shape determined by how the Erection of Plastic shall preceed […] where painful and where slithery cool […] whether some areas should be allowed to flow over the surface so that the passage will be a caress"(Pynchon 713). The reports on the properties of Imipolex G demonstrate technical description infected with a feverish attraction. The great "Erection of Plastic" senses the appropriate times for pleasure and pain and adjusts its composition accordingly. As Pynchon suggests in Greta's account, Imipolex G is sensual not only because it is a fetish, but also because it actually *senses and responds* to stimuli. Greta wanted to "feel it against [her] cunt," Drohne sports an Imipolex G strap-on, and Slothrop's own penis behaves suspiciously like Imipolex. Smart, sensitive, sublime, and robust, the polymer serves as a prosthetic realization of western European manhood. Through its unique sensuality, Imipolex G works as a techno-magical material; it treads in the threshold between living and inert matter, between synthesizer and synthesized, between subject and object of desire. It is even intelligent in its ability to react to its human counterparts: Expressing the will and desire of its masters, Imipolex G is a thermoplastic embodiment of human lust and imagination. It is paradoxically the product of an all-powerful and

systematic science and an unpredictable substance tuned to the some of the more subjective elements of humanity. Oddly, it is a posthuman technology that, through its ratification of human sovereignty over the molecular world, in both scientific and affective registers, contributes to the idea of sovereign human subjects at the same time that it insinuates their obsolescence.

No matter how surprising Imipolex G's physical properties may be, no matter how great its magic effect, *Gravity's Rainbow* consistently leaves room for further potential when it comes to the "Peculiar Polymer," particularly in relationship to the mysterious S-Great rocket. When the rocket is unveiled at the novel's conclusion, readers still have no clear idea about the full capabilities of Imipolex G. It makes up the lightweight "plastic shroud" that surrounds Gottfried during his rocket-powered death, adding yet another layer of mystery to the already deeply laminated semiotics of Imipolex G. The plastic joins sex and death, sensual pleasure and efficient execution. In this way, it appears to be an embodiment of fundamental human mysteries. Its description in scattered accounts, rumors, and partial reports throughout *Gravity's Rainbow*[90] means that, as in *V* and *Lot 49*, full knowledge can only be approached, never reached. By making a revolutionary plastic the object of mystery in this novel (instead of the mysterious woman, place, or concept of *V*, or the stamps and final answers to Oedipa's haunting questions), Pynchon has created the perfect plastic; its flexibility persists across material, imaginative, and epistemological registers. What it can do, what it might do, and what we know about it is always changing. More surprising than any real substance imagined or concocted in the plastics age, Imipolex G is infinitely flexible and always already a manifestation of alchemical desire and fear of the unknown. It is everything the

plastics age wished for and more; the imagination of a miraculous substance has outstripped the usefulness of rigorous scientific epistemology. The most versatile and impressive plastics are the ones perpetually anticipated and desired, but never synthesized. Pynchon's Imipolex G congeals techno-scientific and consumeristic desires into a single imaginary polymer.

Imipolex G simultaneously recalls a real historical phenomenon of techno-magic—a discourse that located the knowledge of technical novelties in the laboratories of specialists by paradoxically celebrating its entertainment value—and amplifies techno-magic's non-rational "wow" to the extent that the polymer evades empirical explanation for its physical properties. In effect, Imipolex G stretches the conventions of science fiction because there is less and less science explaining its existence. Where many in the plastics age celebrated the scientific and technical prowess of industrial chemists as evidence of a collective technological progress, *Gravity's Rainbow* shrouds the science and technology responsible for Imipolex G behind the elusive figure of Laslo Jamf. Jamf may have invented Imipolex, but he is an elusive and mystical figure who is both dead and "was never really alive"(Pynchon 264). Slothrop chooses Jamf's gravesite as the location to purchase information about Imipolex G, bringing him into contact with the ghost of the inventor himself. And it is here at Jamf's grave where it is clear that Jamf is not, as in the case of plastics age researchers, a scientist encoded by metaphors of magic; he is a supernatural force operating outside the purview of objective, rational inquiry. Camping under the shelter of the crypt, Slothrop imagines a visit from Jamf's ghost: "afraid of a visit from Jamf, whose German-scientist mind would be battered by Death to only the most brute reflexes, no way to appeal to the dumb, grinning evil of the shell that

was left"(Pynchon 272). Though no ghost ever appears, "The absence of Jamf surrounds [Slothrop] like an odor, one he knows he can't quite name, an aura that threatens to go epileptic any second"(Pynchon 273). Identifying Jamf as the creator of Impolex, then, does not make the plastic more comprehensible to scientists, because who Jamf is/was and what kinds of knowledge he possesses/possessed remains obscure. His spectral absence underscores the final unknowability of Imipolex G. The plastic emerges from the novel as a strange and disturbing accomplishment for which science cannot fully account, beginning as a new version of existing plastics and ending as the sensual and bizarrely maternal fabric of Gottfried's rocket-powered coffin. In the terms offered by techno-magic, there is magic, but some of the magicians are missing and they fully explain their tricks. To put it in Suvin's terms, the "cognitive" aspect of techno-magic's cognitive estrangement becomes another mode of estrangement.

Strictly following Suvin's generic formulation would likely lead one to label Imipolex G as a derivative of the fantastic as opposed to SF; his identification of the "cognitive aspect" is, after all, instrumental in differentiating SF from fantasy. Yet to call Imipolex G "fantastic" (not rationally derived from existing science and technology) in the sense that Suvin discusses would be to miss the complex exchange Pynchon sets up among Imipolex G, western techno-science, and apparently supernatural forces. Imipolex G is a product of the industrial cartel IG Farben, but the ghost of its creator haunts the novel. Its chemical structure is generally understood, but its physical properties continue to proliferate and take on new valences. Like the ghost of Laslo Jamf who never materializes, Imipolex G does not tear apart the fabric of scientific systems by defying

their laws and expectations altogether, but unsettles the rational speculative mechanisms of SF that make the techno-magical experience possible.[91]

Ultimately, Pynchon creates a novel plastic whose effect is not techno-magical; it is what I have termed "techno-paranormal." Paranormality, as Nancy H. Traill puts it, is generically related to science fiction, and it obtains when "the laws of the physically possible natural domain are not violated, but they are reassessed and their range is extended to include the scientifically unproved (17-18). As a genre, the paranormal recognizes phenomena that resist explanation. The techno-paranormal, then, results when the mechanisms of SF do not supply the full conditions of possibility for anomalous technical artifacts; it is an effect of scientists and engineers generating materials and devices that, paradoxically, elude full explanation in rational and scientific terms. The knowledge that created Imipolex G is scientific, as best as anyone can ascertain, but it is locked away in the labyrinthine archives of international petroleum cartels whose secrecy the novel associates with the occult world of ghosts, séances, and auras. Effectively, that knowledge is as spectral as Jamf, made both present and absent by the organizational structure of military-industrial research giants. As a techno-paranormal version of early twentieth century plastics, Imipolex G does not just parody the empiricist arrogance of plastics utopianism but demonstrates that the science fiction underlying a popular enthusiasm for new and exotic substances is volatile because of the very quality that makes them exciting: they elude precise scientific explanation. In the American technological imaginary that informs Pynchon's novel, appealing magic and ominous mystery are closely linked, and consumer delight exists in dialectical relationship to the horror of the limits scientific epistemology.

No matter how surprising Imipolex's physical properties may be, no matter how great its magic effect, *GR* always seems to leave room for further potential when it comes to the "Peculiar Polymer," particularly in relationship to the mysterious S-Great rocket. When the rocket is unveiled at the novel's conclusion, readers still have no clue about the full capabilities of Imipolex. It makes up the lightweight "plastic shroud" that surrounds Gottfried during his rocket-powered death, adding yet another layer of mystery to the already deeply laminated semiotics of Imipolex. Imipolex in this instance seems to join together sex and death, sensual pleasure and efficient execution. In this way, it appears to be an embodiment of fundamental human mysteries. Its consistent description by scattered accounts, rumors, and partial reports throughout *Gravity's Rainbow*[92] means that, like V and Lot 49, full knowledge of Imipolex can only be approached, but never reached. By making a revolutionary plastic the object of mystery in this particular novel (instead of the mysterious lady, place, or concept of V, or the stamps and final answers to Oedipa's haunting questions), Pynchon has created the perfect plastic. More amazing than any real substance imagined or concocted in the plastics age, Imipolex retains both physical and semiotic plasticity, making it permanently flexible and always already a manifestation of alchemical desire. Imipolex may change, but its shape is never finally determined. It permanently reserves the capacity to surprise us all over again. Because this ideal plastic is not a "real" chemical breakthrough but a fictional substance, Imipolex stands at the crucial interpenetration between plastics and imagination, science and SF. The most versatile and impressive plastics are the ones perpetually anticipated and desired, but never synthesized. Pynchon's Imipolex congeals technoscientific and consumeristic desires into a single imaginary polymer.

V. Plastic, Gadgets, Science Fiction

The statement that *gadgets are made of plastic* now has different consequences. The first industrial plastics, both in fictional and non-fictional writing, stand as an important case study for how novel consumer-grade materials serve as vehicles for techno-magic—the amazement produced when the laws of the material world are challenged, bent, or even demolished. Indeed the differences between science writing and science fiction grow smaller as anticipation, speculation, and fantasy become critical to the representations of revolutionary plastics in both genres. Kim Stanley Robinson's discussion of the incredible "Aerogel" in the *Mars Trilogy* and the ever-versatile living plastics that make up the starship of Octavia Butler's Oankali (*Xenogenesis* Trilogy) provide additional examples of how plastics in science fiction are composed of the same alchemical desire for re-oriented matter as in actual science journalism and advertisements for new materials, new interfaces, and new devices. When I say that gadgets are made of plastic, then, the statement holds true because most "real" gadgets have typically been made of industrial plastics, and plastic designates not only a kind of material, but also a patent optimism about, desire for, and fascination with the potential of science and engineering. Plastics discipline "magic" within knowable man-made processes and technology, but allow for key ambiguities in their chemistry and potential. Plastics are thus, paradoxically, scientifically possible but phenomenologically surprising. Scientists—not wizards—built them from the molecular level, yet despite their scientific plausibility and commercial availability they still disrupt lay expectations of matter and appear for all intents and purposes "magical"; techno-magic emerges as the means to understand plastics' existence for popular audiences. In the wake of their

subsequent disenchantment in the mid 20th century, that torch has since passed from plastics to the broader field of gadgets, among other successors. Literally and figuratively, gadgets are made of plastic.

Because gadgets (both real and imagined) are partly made of this fictional techno-magic, then they serve as an important juncture between science and science fiction. That an imaginative force has helped isolate the curious substance of interwar plastics as well as historicize gadgets speaks to the intersection of literary fiction and popular narratives about commodified personal technologies. Magic in the context of consumer capitalism, after all, serves as a pretense that obfuscates the very real science and labor needed to mass produce these consumer goods in the first place. The appearance of Imipolex G in *Gravity's Rainbow* is no authorial idiosyncrasy; the rhetoric of magical technologies occur in equal measure, both in literature and so-called "real life." The metaverse in *Snow Crash* and the World Wide Web, the communicators of 1960s Star Trek and the first wireless smartphones, *Neuromancer's* cyberdecks and contemporary tablet computers—each is crafted as a novel and incredible device according to the visual, aural, and written rhetorics that make up its representation. These analogues exist between fiction and real life not simply because they are engaged in mutual imitation, but because they are both part of the same technophilic cultural imaginary. Techno-magic enforces a rupture between the categories of "real" and "imagined." Techno-magic invoked in the context of consumer technologies begins to resemble the activity of the SF genre as defined by Darko Suvin: "a literary genre whose necessary and sufficient conditions are the presence and interaction of estrangement and cognition, and whose formal device is an imaginative framework alternative to the author's empirical

environment."[93] The kind of perceptual shift demanded by SF is similarly demanded by the wonders wrought from industrial alchemy, the rhetoric that in previous decades created the horizons of possibility that facilitated Suvin's definition in the 1970s. Both SF and techno-magical commodities require their consumers to place what they know in brackets and consider novel configurations of the world. Furthermore, techno-magic and its new alchemy, through close alliances with consumerism and advertising, push estrangement on its (willing) consumers even more so than SF. If SF asks "what if?" through literary speculation, then techno-magic asks "what next?" by baiting customer desire, exciting surprise, and showing off a theatrical disregard for the laws of matter. Rather than drawing a simple equivalence among SF, techno-magic, and gadgets, it is better to see the three semiotic realms inter-penetrating. Techno-magic should be thought of as more of a junction between "real" science and science fiction.

The wonder surrounding cellulose and Polystyrene now surrounds piezoelectric touch surfaces, uni-body aluminum manufacture, and compact flash memory. As techno-magic lives on, however, so too does the potential for the emergence of techno-paranormal. When global economics and miniaturization occlude the origins and inner workings of contemporary devices, the potential for techno-magic to transform into techno-paranormal remains if not grows. In *Gravity's Rainbow*, Walter Rathanau is both the "prophet and architect of the cartelized state" and a ghost who counsels the present-day IG Farben leadership from beyond the grave, offering megalomaniacal aphorisms about institutions, science, and technology (167). This is no coincidence. The techno-paranormal reflects imbalances of knowledge and power with an unsettling feeling of dread and helplessness. Ignorance isn't bliss; it's the high price of specialized techno-

science paid by citizens outside the magic circle of the technocorporate elite. Without a clear indication of the purpose or origin of technologies, the fun is over, and the bounded amazement of techno-magic gives way to an open-ended unease that any result is possible when origins are unknown. Popular television shows like *Fringe* and *X-Files* fuel their conspiracy theories with the techno-paranormal: powerful if shadowy corporations and governments conceal the science behind their technologies with the opacity afforded to them as vast institutions. DeLillo's *White Noise* similarly invokes the techno-paranormal through artifacts like Dylar and the "Airborne Toxic Event," whose precise origins and composition remain occluded by covert research and incompetent bureaucracies. Techno-paranormal even describes the effect of numerous popular documentaries and books about ancient monuments like The Nazca Lines and The Great Pyramids, ascribing otherworldly powers to their construction in the absence of a clear consensus about techno-scientific explanations.

In Pynchon's novel and these other cases, the techno-paranormal expresses discomfort with not only ignorance, but with the inaccessible elites that control an always inaccessible knowledge. Thus, in order to entertain, techno-magic requires its audiences to consent to an imbalance of power and knowledge, as well as a specific consumer context that promises entertainment as both the cause and effect of technological development. Looking back on the history and early rhetoric of plastics, then, we see that popular enthusiasm for plastics was not just a consumerist formation of technoculture, but also a consistent disavowal of an equally available, non-scientifically rigorous, and potentially more political means of approaching technological novelty. Examining the generic continuities and differences between the magical and paranormal allows us to

understand the relationship between genre and late capitalism; the persistence of techno-magic in the face of the techno-paranormal depends on the synergy between science fiction and consumerism. Techno-magic mobilizes science fiction as a means to transform imbalances of technical knowledge and institutional power into an entertainment effect, and that effect is a valuable commodity. At the same time, that commodity would not be possible without the implicit narrative of improvement and progress that motivates and is motivated by consumer activity. By shifting the discussion of plastics away from commodities to the epistemological complexities introduced by military and industrial research, Pynchon's novel explores the techno-paranormal potential of a class of substances that pervades postwar US culture. By de-coupling techno-magic and early plastics, Pynchon's alternative re-enactment of the plastics age suggests that science fiction in twentieth-century United States, in the plastics age and beyond, is not just a literary genre; it influences a broad and persistent vision of the arc of the future, imagining prior to the fact the complex responses to technological achievements that rest at the limits of human imagination.

Thinking of techno-magic as a junction between science and science fiction does not simply mean that SF helped shape what gadgets are (and were) produced. Though that statement is certainly defensible, I'd like to conclude by using this chapter's discussion of gadgets, SF, and magic in order to restore symmetry to this perspective: If SF changes the way we study gadgets, but reciprocally, gadgets also change the way we can study SF. Because of their instantiation through techno-magic, gadgets, no matter where they appear, demonstrate the cultural relevance and generic permeability of SF. By their existence and composition, gadgets stretch the definition of SF beyond the

literary. They demonstrate that the values, activity, and assumptions of SF not only exist outside of literature, but also instantiate an entire tradition of consumer technologies. If, as this history suggests, we understand the continuities between techno-magic (and all its attendant desires), gadgets, and SF, then deciding what counts as "science fiction" and defining the boundaries of the genre become much more complicated questions. Wherever novel gadgets appear, they elicit an important estrangement from the previous laws and substances of the empirical world. Through gadgets, SF retains an expansive scope that spans literature, consumer technology, advertising, journalism, and more.

CHAPTER 2: RECORDING LITERATURE: RECORDING, REPLICATION, AND THE CYBERNETIC DIALECTIC

In the concluding scene of Orson Welles's *Touch of Evil* (1958), Detective Miguel Vargas brings his rival to justice with a tape recorder. Hank Quinland, whose practice of planting evidence on suspects evades detection until the very end of the film, at last confesses unintentionally into a microphone planted under the jacket of his partner, Menzies. Quinland's self-incrimination consummates an elaborate sting operation wholly reliant on portable electronics. Menzies carries a hidden microphone and wireless radio transmitter as he walks with Quinland through a wasted industrial zone; Vargas carries a receiver and tape recorder and trails closely behind them. Weaving through tall metal structures and shabby buildings, Vargas remains undetected as Menzies walks with Quinland and asks him leading questions. Both Vargas and Menzies occupy tenuous positions: Quinland is suspicious of the string of questions directed at him, and Vargas consistently sacrifices good hiding places for better radio reception. The scene comes to a climax when Menzies and Quinland walk over a low bridge, forcing Vargas to wade into the dirty shallows and walk directly underneath them. Vargas lifts the large receiver/recorder above his head to keep it dry long enough to record the conversation, and Menzies, sensing that his time is running out to trap his partner into a confession, intensifies his questioning. At last Quinland slips, and his brash announcement, "Aiding justice, partner," both confirms that he has been planting evidence and serves as material evidence against him through the medium of the tape recorder.

As much as it may seem to resemble contemporary crime drama in its use of recording technology to secure a confession through clandestine means, Welles's film

does not celebrate Quinland's confession. To be sure, Quinland is not a stock villain, and the recording of his confession, while it ostensibly serves the law, is also invasive and unsettling. Vargas's recourse to deception and surveillance is a ruthlessly effective technological trap carried out at the expense of the friendship between Quinland and Menzies. What this relatively new technology of portable magnetic recording means is caught up in the ethical confusion of the film's final showdown. The portable recorder emerges as a technology with an uncertain valence, a device that may do justice, harm, or both; it is not an instrument that unblinkingly hauls culprits into the material theater of juridical evidence. It is instead symbolic of the film's ambivalence toward a new technology of replication.

This murky and conflicted final scenario of *Touch of Evil* raises a question central to the study of electronics in the twentieth century: what does it mean to record and be recorded magnetically—on a format which allows recording, re-recording, mixing, and copying? Magnetic recording, while not literally "digital," was a crucial development for digital microcomputing, and its capabilities, while subject to the linear progression of tape, resemble later digital technologies in terms of user-driven manipulation of data. As Katherine Hayles points out, the popularization of magnetic tape and recording devices in the 1950s created an environment in which "the switches activating the powerful and paradoxical technoconceptual actors of repetition and mutation, presence and absence, were in the hands of the masses […]."[94] In an important way, magnetic recording made the critical terrain of posthumanism accessible to the laity as a practice. Although posthumanism contains within it a diversity of beliefs and assumptions, Hayles identfies crucial terms with far-reaching import. Recording's destabilizing effect on concepts like

identity, language, and ownership represents a foundational turn in U.S. technoculture that matters to all variations of posthuman thought. And it is here that the work of Jean Baudrillard in *Simulacra and Simulation* intersects with posthumanism: copies obliterate the original. On the one hand, portable magnetic recorders stabilize moments in time and space which would be otherwise be fleeting and ephemeral. Relatively small and lightweight, magnetic recorders enable the recording of an unlimited variety of sounds on site. On the other hand, however, the ability to record more may not be such an exhilarating capability. This scene is an artifact of specific anxieties surrounding portable recorders: that all sounds and voices are available for recording means that one could be on tape at any moment, and recorded material could be captured, repurposed, or manipulated. Quinland's own voice, played before him as he dies, no longer obeys him once captured on tape. Vargas cracks the case, but his victory raises concerns about surveillance, replication, and personal identity that resonate with broader cultural uncertainty about recording technology. Serving human justice establishes a posthuman sensibility; the capability to record a human voice complicates our relation to our identities and raises questions about agency and meaning.

Vargas's recorder straddles this paradox, caught between the possibilities of what the tape recorder can archive and preserve and the fears of what it can capture, manipulate, or re-purpose. But in order to cast the final scenario in terms of repetition and mutation (to use Hayles' terms), *Touch of Evil* treats the issue of recording in a purely juridical context. As he uses the recorder to build his case against Quinland, Vargas's recording belongs to the U.S. legal system as evidence in a police investigation. In other words, personal ownership of recorded information is never an issue. It is telling that the

terms repetition and mutation are perfect-passive constructions. When deployed in the context of information networks, they imply that a system or systems bring about the actions of repeating and mutating that are not necessarily human subjects. A posthuman reading of magnetic recording in this scene in the context, therefore, verges on tautology—the terms occlude the importance of perceived agency when signifying any act of recording.

Touch of Evil matters to this project precisely for what it excludes in order to map the binary terms of certainty and uncertainty onto its conflicted *noir* morality. What this scene leaves out, what Hayles's terminology relocates from unmentioned to invisible, is user investment in recordings as personal property. What do we make of being recorded or recording magnetically? The answers are foundational to any theory on contemporary technoculture. While repetition and mutation certainly are useful terms to begin to formulate an answer, *management,* a way to conceptualize and manipulate information as a sovereign user, is a crucial component of any cultural vocabulary that describes the legacy of magnetic recording.

The literature treated in this chapter, not previously grouped together as a set of related texts, falls under the category that I call "recording literature"—each piece features magnetic recording technologies as instrumental to its narrative structure. The narrative of a work of recording literature might be framed as a recorded act, or it may be punctuated by snippets of playback, or even emulate the activity of tape editing itself. Where in the previous chapter plastics enabled handheld devices both imaginatively and materially, magnetic recording establishes material and imaginative foundations for gadgets. By facilitating personally managed databases of electrically copied material,

magnetic recording indexes a broader cultural fascination with making and managing copies. By examining instances of recording literature in the twentieth-century US, this chapter will discuss recording technologies as venues for "management," a cognitive activity that, when mobilized by the hardware and assumptions of consumer technologies, constitutes an "ideology of gadgets" that shores against the destabilizing effects of posthuman technoculture. In the first section, I will theorize the ideology of gadgets as a constitutive force in articulating the cognitive activity known as "managerial work" to a broader epistemology of technology that stands as a dialectical opposite of posthumanism. This ideology, while present in popular technoculture during the emergence of magnetic recording technology, has a definite literary presence as well. In the second section, I will discuss William S. Burroughs cut up and fold in method, taken by Hayles as a germ of posthuman thinking about magnetic recording, and demonstrate through a re-reading of *Ticket that Exploded* that the cut up method dialectically unfolds the posthuman and the gadget; its concerns are not univocally posthuman. As Burroughs's conflicted presentation of recorders and exploded identities demonstrates, the posthuman and the gadget contain the terms and possibilities of each other. Moreover, the coherence of each depends on the dynamic repression of the other; in order to have gadgets, one must disavow the presence of cybernetic systems, and in order to acquire a strictly posthuman sensibility, one must ignore the terms and habits of the US consumer culture that apprehend and circulate so many of these technologies. I will follow up this analysis with the ways in which Fred Saberhagen's *The Dracula Tape* and Richard Powers's *Prisoner's Dilemma* explore magnetic recording as an activity that, even in the act of copying, separates the replica and replicated. Ultimately, these texts

treat recording as a concept discrete from replication, in which the recording and recording technologies are both foundational to individual identities and provide a means for collectives to exist in which individual agents still matter even in a matrix of cybernetic technologies and Baudrillardian simulacra. The literature of recording indicates that, no matter how revolutionary the capability to produce copies may be, gadgets are a salient commitment to discipline technological powers of replication to make them an opportunity for control and meaningful personal decisions rather than evidence of the vastly complex relations among information, replication, embodiment, and meaning that recording technologies might present to human identity and liberal democratic collectives.

I. Managerial Work, Compact Cassettes, and Gadget Ideology

Managerial work is a cognitive activity, not solely an ideological apparatus. But gadget ideology—the system of imagined human/technology relations that make the concept of the personal database metaphysically possible—depends wholly on the cognivite activity known as "managerial work" as a foundation. I offer here the basic features of gadget ideology vis à vis the compact cassette, not as a means to do away with posthuman theory, but as a dialectical and productive way to think about its limitations. By examining the relationships among gadget ideology, managerial work, and cassette culture, we can see how early recording technologies, though part of a lineage of posthuman technoculture, also traded on the concept of the liberal human user.

Cognitive science and electronic device interface design are interpenetrating fields. As scholarship in adaptive cognition suggests, mental models of networks depend

on the representations offered by interfaces. What the interface presents as the organization and substance of a given network (whether that network is as local the internal workings of a mobile phone or as global as the relationship between that phone and other mobile devices) acts as a representative sample of that network. And it is from these samples that users construct mental models and represent to themselves how complex systems work and what their relationship is to those systems.[95] Cognitively, interface is not just a "skin" over the real internals of the technology in question; it is a technology all its own. Indicative of a broader connection between interface design and the cognitive sciences, Jared Spool connects the causal relationship between interface design and user cognition, "Designers can create specific mental models to eliminate perceived complexity."[96] This statement suggests that different mental models are possible depending on the specific design of an interface (a crucial assumption for cognitive interface studies), and even makes a tacit claim that complex systems need not be rendered (and thus experienced as) complex. Moreover, this statement makes it clear that cognition can be a direct effect of interface design. From this perspective, interfaces, although they may exist in a truly cybernetic relationship with user cognition, can posit mental models of interaction that reinforce the idea that users unidirectionally regulate technology.

Importantly, however, most interface designs, no matter how radical their presentation of systems and information, draw on an imagined or surveyed user whose needs, goals, situational limitations, and decisions serve as the focus of design. In other words, most device interfaces depend on the concept of management as the occasion for human/technology interaction. As Winograd and Flores assert, management is "taking

care of the articulation and activation of a network of commitments, produced primarily through promises and requests"(Winograd and Flores, 151). This definition is a broad one, but it is important to emphasize that management here is an attempt to describe the relationship between elements of a system, not simply give a name to yet another illusion of empowerment as defined by post-marxist analysis of contemporary consumer culture. The ideological function of management in its various manifestations is the subject of another conversation altogether, but crucial here is the recognition of management as a relative position in a system established by physical stimuli. This is not to say that the perception of management is objectively "true," but that ideology cannot explain away interface as imagined relations to real conditions. Certainly cultural or ideological readings of specific interfaces can be productive, as can an examination of what shapes and determines the terms of human/device interaction, why privilege management, for instance? But what is not reducible to mere ideology is the activity of management itself, or what I will call *managerial work*. I borrow this term from Henry Mintzberg, whose work informs Winograd and Flores' identification of management as the central activity of human/computer interface. In the context of either institutions or digital systems, managerial work is a cognitive activity through which managers will "create, take care of, and initiate new commitments within an organization."[97]

Where the bulk of posthuman theory maintains that cybernetic metaphysics compromise models of liberal subjectivity such that transhuman and posthuman identities emerge in the postwar "information age," I argue that gadgets mobilize managerial work as a means to preserve and extend the liberal subject through commercially available hardware. To be clear, the relationship between management and gadgets can be defined

as follows: gadgets are cultural, an imagined configuration of users, technology, and information that allows personal database technologies and liberal subjects to coexist and prizes consumer choice and personalization as the primary effect of information society. The perception of management fuels this cultural form, though gadgets are by no means the only way that management as a cognitive process may be understood culturally. *Gadgets, then, are a specific commodification of managerial work.*

Much of the current thought on interface and cognition focuses on computer interfaces (from PCs to cellphones), but portable magnetic recording technologies—particularly with the development of the compact cassette—participate in a qualitatively similar network of "commitments and desires." The activity of using a magnetic tape recorder or portable stereo resembles managing a computer or even an office. What to listen to, what to record, what to give to a friend, what goes on a given tape, what to collect, what to throw away: these are the decisions that define a managerial relationship to a network, save that in this instance the information is not technically in a digital format. While posthumanism could view magnetic recording as a potentially de-stabilizing force that threatens the very integrity of the human form, popular practice saw an increased demand for personalization and control.

As magnetic recording technologies developed into a consumer commodity in the mid to late twentieth century, consumers were particularly excited about technological capabilities that allowed them to individually manage content easily and affordably on a standardized format. Far from the view outlined by Hayles, the popularization of cassette tapes, personal music players, and customized music collections subsumed posthuman views of information within a broader hermeneutic of consumer choice, with hardware

providing the facilitator between information and its users. Where Hayles points to artifacts such as the electronic rat, simulations, and mobile robots as nexuses of technical and cultural activity that index the growth of posthuman thought, gadget ideology emerged out of the wide-spread consumer availability of devices such as the handheld radio, magnetic tape recorder, personal stereo, personal computer, mobile phone, and portable media player. Each in its own way demonstrates not only the persistence, but also the amplification of the idea that personal hardware can protect its users from the disruptive implications posthumanism offers to liberal subjectivity, and that personal devices can make individual choices matter, and therefore the individual herself, in the face of a vast and potentially alienating informatic landscape. Based on the cognitive process of managerial work, then, gadget ideology positions user choice within broader, liberal-consumerist ideology.

The gadget ideology is characterized in two ways in its articulation of management, metaphysics, and hardware:

1) Gadget ideology embraces the idea that data may be replicated, mutated, and that it organizes embodiment and materiality. In short, the ideology of management accepts the metaphysics of information as outlined in posthumanism, but it importantly conceives of local interface and hardware as a means by which some measure of control may be exercised over any potentially threatening proliferation of information and intelligence.

2) Recognizing the basic metaphysics posited by gadgets, the interface, software, and hardware of the personal device exist as the prophylactic across which the

metaphysical implications of posthuman information do not cross. The user is selectively immune to posthuman metaphysics through managerial work.

Thus, in order to conceive of databases, networks, and computers as gadgets instead of cybernetic systems, users must *represent* these technologies in the cognitive and cultural senses of the word, in which users signify the relationship among information, technology, and users to themselves and others as part of a schema of concepts and objects.[98] Critically, however, users represent gadgets in a Latourian sense as well; they speak on behalf of gadgets to interpret interaction with these artifacts as evidence of a liberal manager/consumer subject. In this context, gadgets are actants, the empirical "facts" of technology and practice that actors use to align themselves into communities of independent and creative consumers of database technologies. Like scientists marshalling data for support of a theory, gadget users "speak in the name of new allies that they have shaped and enrolled."[99] This added Latourian dimension to what I have established as a cognitive/Marxist perspective on gadgets and management is significant. But management and liberal humanity are by no means terms that must be coupled with one another. The activity of management takes place in non-human systems as well. For instance, automated systems manage temperature in large institutional buildings every day, working with discrete commands, detected temperatures, and building heating/cooling resources to regulate room temperatures. The ideology of gadgets, though, does not recognize a building climate control system as possessing the necessary faculties to qualify as a liberal agent. In Latourian terms, therefore, users build a case for their agency by disregarding instances non-human management while focusing

on human management, translating the act as evidence for the solvency of consumer subjectivity.[100]

The history of the development of the compact cassette demonstrates the ways in which users mobilize personal database technologies as actants, translating them into gadgets that testify to the significance of their consumer choices and personal taste. Leading up to the commercial debut of the Philips Cassette in 1963, breakthroughs in materials engineering produced more and more affordable incarnations of magnetic tape media. This succession of price drops led to a proliferation of open-reel tape recorders in the 1950s and 1960s, consumer devices suitable for those who wanted to make their own sound recordings and playback music from a limited selection of prerecorded albums available on open reel tape. The open reel format was appealing not only because advanced models provided good sound fidelity, but also because they offered playback in true stereo sound (a first). But because of relatively high cost, scant music availability for the open reel format, and the often difficult task of threading magnetic tape onto large and unwieldy reels, the portability and popularity of open reel players was limited, and they did not threaten phonographs as the main format for prerecorded music.[101] Recording and audio playback were intriguing possibilities given the various breakthroughs in magnetic recording technology, but tape players were on average still too costly. Until the availability of low cost cartridges and cassettes starting in the 1960s, magnetic tape remained the medium of audiophiles and enthusiasts, though it had come a long way from being a mere novelty or specialized tool of moneyed institutions.

This history of magnetic tape is precisely the reason that the release of the compact cassette was so exciting to consumers. In the early part of the century it was too

complicated, then in the 1940s it wasn't cheap enough, then in the 1950s it wasn't easy enough to use and was poorly commercialized, but finally magnetic tape made its way into broader consumer audio markets. In 1963, after a series of failed attempts by CBS and RCA to introduce cassette-based tape formats,[102] Philips announced the release of its "pocket cassette," an audio format that internalized the two spools of an open reel player within a single plastic casing. This design allowed for easier loading and unloading of tape, not to mention increased portability. According to Mark H. Clark, the Philips engineers had five design goals in mind when engineering their version of the magnetic tape cassette: 1) the smallest possible dimensions with a playing time of 30 minutes; 2) a simple, sturdy construction; 3) reliable playback; 4) maximum protection of the tape; 5) low energy consumption during playback and rewind.[103] The result was a low-cost, reliable, and easy to use consumer technology for sound recording and playback, something the world had not seen up until that point. Philips coupled its elegant design with relaxed licensing policies, making their format available to nearly manufacturer that wanted it at little cost.[104] This combination of appealing design and widespread licensing helped the Philips cassette endure as a format, because many major manufacturers immediately adopted the compact cassette as a standard in recording media.

Importantly, however, it was the cassette's ability to manage content that helped make it so popular. Comparison to the rival 8-track format is illuminating in this regard. Although the cassette faced stiff competition from the 8-track, another cartridge-based tape format, over 250,000 cassette recorders had been sold in the United States by the mid 1960s.[105] The 8-track offered superior sound quality as well as a more extensive library of pre-recorded music, and it continued to compete with the cassette until the

1970s, but several key differences between the 8-track and cassette led to the failure of the 8-track to ultimately fail as a consumer audio format. After some re-tooling, the 8-track could record sound in a way similar to the cassette, but there was no way to pause or reverse the tape during recording sessions. Furthermore, the 8-track only offered only continuous playback and did not allow users to scan the contents of the tape. The cassette, on the other hand, allowed for scanning during playback and recording, enabling a customized playback experience as well as opportunities for amateur sound editing, though the sound quality of early cassettes was far less than that of the 8-track.[106] Thus, as Don Humphries notes in his 1970 comparison of 8-track and cassette formats, "Eight-track remained the best continuous-playback medium, and cassette remained the best recording system."[107] But the idea of a home recording system lifted cassette platform sales despite early poor sound quality, and Philips saw an unexpected demand for blank tape right away. Instead of using the cassette recorders as novel playback devices and dictation machines, consumers were using them to record their own music.[108] The cassette's catalyzing of this surprising interest in home sound recording/editing, combined with the increased audio quality of the cassette over the successive decades as well as the introduction of cassette players into automobiles in the 1970s, saw the cassette trump the 8-track in the1970s and compete with the LP as the dominant format for pre-recorded music from the 1970s to the early 1990s.[109]

Though the full popularity of the cassette took decades as well as several technological and corporate synergies in order to come to fruition as an audio format, it made several technological capabilities available to general audiences of non-specialist consumers, although some these capabilities had certainly been available in previous and

more specialized devices. The total package, however, was unique to the cassette as a keystone in a personal information management system:

1) The ability to record and re-record sound from a local microphone
2) The ability to record and re-record sound from a radio broadcast, LP, or tape cassette
3) The ability to pause, rewind, and otherwise scan tape content
4) The ability to pause, rewind, and otherwise scan the tape while recording
5) The ability to record and playback sounds through a portable device
6) The ability to vary speeds of recording and playback
7) The ability to store an increased amount of playback time in a decreased amount of physical space relative to vinyl records or previous tape formats
8) The ability to play back all sounds gathered by the above means on the same low power and inexpensive piece of equipment used to record those sounds in the first place, all in a format that was widely licensed

Ultimately, these capabilities together allowed users to treat recording as a matter of individual choice and content management. The success of this device paradigm marked the beginning of a significant shift away from sound replication as a matter of quality and fidelity to sound replication as a matter of consumer-grade personal database creation.

Home-made music collections recorded on compact cassette represented not only the tastes of their creators, but also the interpersonal relationships through which they were created, gifted, or exchanged. The mix tape, for example, was not just about arranging music according to intensely personal criteria; it was about forging a bond with

someone else by presenting that arrangement. Accordingly, in his introduction to *Mix Tape*, a collection of personal reflections on so called "cassette culture," Thurston Moore notes "[This book] simply exists as a nod to the true love and ego involved in sharing music with friends and lovers."[110] One thing remains true of nearly all mix tapes: they direct the use and deployment of cassette database technology for self-articulation. Page after page of Moore's collection reinforces this point. Every featured tape is coupled with a personal reflection. Many tapes include elaborate and homemade cover art, in addition to being composed around special themes particular to a certain person, relationship, or occasion. They are artifacts of the cassette's function as an expressive medium.

The first decade of the twenty first century saw the proliferation of digital music players that, though very different from their cassette-based predecessors, crucially remediated portable stereos in their facilitation of mobile and customized music libraries. Though not the subject of this analysis, portable media players are important to any consideration of recording technology not only because early magnetic recording technology was the antecedent for what is now an even more popular consumer phenomenon, but also because it demonstrates the robustness of the gadget mobilization of managerial work as a way to situate gadgets as platforms for personal choice.

Given the characteristics of gadget ideology and its role in the rise of consumer electronic database technologies through the compact cassette, magnetic recording is a nexus of possibility from which cybernetic and gadget imaginations emerge. It is at once a crucial concept to both cybernetics and contemporary consumer hardware. Literary examinations of recording disclose the importance of gadget ideology to narrating

identity, even as those examinations might also explore posthuman possibility. Postwar American literature that figures recording and replication is not just a literary record of emergent posthuman thought; the gadget ideology that traffics consumer hardware weighs heavily on imaginations of these technologies and their users as well.

II. Reading Recording Literature through the Cybernetic Dialectic

Even Norbert Weiner, one of the founding fathers of cybernetics, felt the need to protect the liberal agent against the implications of cybernetic circuits.[111] Works of recording literature are an important archive for understanding the dialectical interplay of cybernetics and gadgets in US technoculture. They build within their narratives the consequences and possibilities offered by personal recording technologies, and thus underscore the interrelationships among narrative, recording, and identity that unfold around the act of recording. In this section, I will examine several works of recording literature in order to demonstrate how gadget ideology and posthumanist thought are dialectical responses to the transformative capabilities offered by consumer-grade recording technologies. In each text, recording provides a way to perform the managerial work that is so crucial to gadgets as technologies of liberal agency. Moreover, these texts couple recording and management so that recording emerges as a concept of repetition that differs from posthuman or Baudrillardian replication. Cybernetics may see repetition in a system as a single type of activity, but for these narratives, recording carries with it a valence of authenticity and human management of technological resources.

Although it is cited as an instance of early posthuman thought, William Burroughs's *The Ticket That Exploded* demonstrates how the concepts of gadgets and management

forclose any fundamental transformation of liberal subjectivity. Hayles points to this text, along with Burroughs's "cut up/fold in" method—a style of writing that repeats and splices pieces of the text into itself—demonstrates "recursivities that entangle inscription with incorporation, the body with embodiment, invite us to see these polarities not as static concepts but as mutating surfaces that transform one another[…]" (220). In other words, Burroughs's use of words and sound as a metonym for embodiment enable the tape recorder and practices of recording/splicing to serve as a prototype for posthuman technoculture, where replication and recursion know no boundaries once both subjects and their environments can be processed as data. For Hayles, *Ticket*'s portrayal of recording creates a universe in which "the observer cannot stand apart from the systems being observed" (221).

Hayles' interpretation of this novel is an important contribution to the literary history of posthuman thought, but *Ticket* equivocates in its experimentation with posthuman metaphysics. The novel's basic schema for human/technology interaction is the gadget. While it is true that the novel displays a fascination with radically transforming the relationship between subjectivity, embodiment, and information, it cannot help but posit a cypto-user and participate in the ideology of management. The narrator mentions the Philips compact cassette recorder specifically, instructing the reader to take one up and record his/her sound environment and learn to manipulate it accordingly: "after analyzing recorded conversations you will learn to give the cues you will learn to plant events and concepts" (208). These instructions do not fit with Hayles' reading of the novel, nor are they consistent with the text's constant insistence that "you are a programmed recorder," a node in a broader network of pre-recorded and predictable content (213). While this

passage maintains the cynicism that everything is predictable, that people are subject to "cues" and repeat the same clusters of behavior, the ability to learn about them and manipulate them through the compact recorder suggests that it is in fact possible to exist discretely from observed systems. The capacity for analysis and play, the idea that taking up a recorder of one's own puts one in a position to manipulate instead of being manipulated, is the central purpose of the ideology of management. Claiming that everything is programmed, the novel concedes the possibility for self-programming: "you are a programmed tape recorder […] you don't have to listen to that sound you can program your own playback" (213). Crucially, self-programming is supposed to solve the problem of pre-programming. And while the language of "programming" aimed at a human subject appears radically posthuman, one must ask what the real difference is between self-programming and liberal subjectivity. If, as scholars have suggested, the seed of the liberal subject is the ability to partition self from environment, then the novel's recommended use of the Philips recorder restores this separation through both hardware and the performance of recording. In the final lines, culminating a novel that tours the madness brought on by the cut up/fold in metaphysic, self-editing by use of a compact cassette recorder appears to be a viable cure for existence as chaotic and mutating information: "the more you run the tapes through and cut them up the less power they will have cut the prerecordings into thin air"(217). If the solution for a world, body, and identity comprised of pre-recordings is to edit them out of yourself through a gradual process of analysis and cutting, this assumes that there is a "you" in question who will exist once the prerecordings vanish "into thin air." Although, on the one hand the metaphor of recording successfully disrupts conventional metaphysics of subjectivity and

environment, on the other, it cannot help but restore them; user and hardware are dialectically linked. This is not to say that any and all posthuman imaginations necessarily posit a user subject-position; however, *Ticket* demonstrates how the ideology of management infects posthuman scenarios. In a posthuman reality that draws on the imaginary of consumer technologies, organizing information and subjects by and through the concepts of gadgets and managers persists because they are integral to lay-understandings of subjectivity and informatics. Pure posthumanism, devoid of the ideology of management, may be able to survive only in a laboratory or in the second-hand discussions of disavowing critics, separated from the influences of consumer culture on the technological imagination.

If Burroughs's vision is or approaches a posthuman one, it is also one fundamentally influenced by gadgets and the user subject position implied by their use. Both ideas are integral to propagating one another. In what I call the cybernetic dialectic, posthumanism and gadgets simultaneously repress and enable one another. When presented with the problems of replication and mutation, feedback and cybernetic circuits, information and embodiment, the two positions respond differently. For posthumanism, these concepts and artifacts effect a total metaphysic that understands everything as information. For gadget ideology, expanding the definition of what can be understood and processed as information further empowers the personal information database as a tool for individuating subjects through that individual's implication of managerial work, consumer buying, technological know-how, etc. Buying into gadget ideology certainly requires a logical inconsistency that represses the full implications of posthuman technology; everything is information except for the subject user—that person is special

and his/her choices matter. The user is not reducible to pure information. On the other side of the dialectic, posthumanism, while a contested, varied, and complex school of thought, has risen to cultural prominence not only by influential scientific discourses, but also by the circulation of consumer electronics. The cybernetic dialectic is as old as cybernetics itself.

As Hayles defines virtuality, an important mechanism in so many versions of posthumanism, as "*the cultural perception that material objects are interpenetrated by informational patterns.*"[112] While Hayles demonstrates how this idea has spread throughout popular culture by the scientific disciplines of molecular biology and cybernetics, the primacy of information as a means to make sense of the world also owes its popularity to gadgets. Mix tapes and personal recorders; personal computers and the World Wide Web; portable media players and remote databases of video and music: each collection of technologies and practices is a way for non-specialists to engage in posthuman concepts of information without detailed knowledge of molecular genetics, computer science, or neural networks. But because they are motivated by a consumer economy in which ordinary subjects interact with successfully commercialized devices, gadgets rely on liberal subjectivity in order to circulate as commodities. Choice, style, personal property, and individuality all figure heavily as points of emphasis in marketing electronics. Thus, much of the ways in which ordinary people encounter and propagate posthuman concepts of information also enforce the ideology of management. To say that posthumanism pervades our culture is analogous to concluding that *Ticket* is an example of early posthuman thought on recording. Both repress the fact that user conceptions of virtuality and replication are mediated by popular electronics. Hayles

does emphasize that virtuality can produce a variety of metaphysics, but each one ultimately threatens the integrity of the liberal subject (80). Burrough's novel, then, shows both the potential and the limitations of a posthuman challenge to liberal subjectivity when mobilized through consumer hardware.

Other literary meditations on magnetic recording, instead of charting the gradual takeover of posthuman thought, similarly demonstrate the activity of the cybernetic dialectic. Fred Saberhagen's *The Dracula Tape* (1975), while it has received little critical attention of any kind, relies on the cybernetic dialectic—the dynamic interaction of posthumanism and gadgets in the face of cybernetic technologies—in order to manifest its hybridization of myth and contemporary electronic technologies. Saberhagen's novel is the transcript of a voice recording allegedly made by Vlad Tepes, detailing the real story of Dracula's life. The account is confessional and seeks to clear Dracula of his nefarious reputation by setting the record straight—it was Van Helsing who was the real villain; Dracula was only a man in love. By the novel's framing of the narrative as the contents of a strange cassette, we are meant to believe that Vlad uses a found recorder to chronicle his exonerating account, then abandons it for later discovery.

While this text certainly falls within broader cultural traditions of gothic horror, popular fiction, and vampirism, it is also interesting as a study of how magnetic recording, as a technology and a practice, signifies user subjectivity. Reading the text as a posthuman response to magnetic recording makes sense for several reasons. As myth materialized in SF through the format of magnetic tape, the Dracula Tape metonymically represents Vlad Tepes, and for all intents and purposes, the tape *is* Tepes. Saberhagen's Dracula exists only as an informatic pattern, an impression left on audiotape. Aside from

the tape, Dracula does not exist, neither to the reader who only encounters the transcript of the tape, nor to the genre of the framed narrative which can encounter vampires only through found audio cassettes containing first person testimony as opposed to an unframed narrative focalization of Tepes. For the space between horror and realist genres that the book writes within, posthumanizing Dracula preserves the mystery of the original legend while comically manifesting it within a contemporary technocultural milieu.

Strangely, however, even though the novel claims that the tape was "found in a recorder in the back seat of an automobile […]" and that audio evidence in the tape's background noise indicates that the story was recorded in that same vehicle during a snowstorm, nothing about the recording resembles a single-session endeavor. Firstly, the tape breaks into "tracks" that divide the narrative into chapter-like sections, importing features of pre-recorded music or a even a mix tape into what is initially presented as a piece of dictation. Furthermore, the vampire storyteller remembers every detail of the experiences he shares, right down to specific citations from letters and journals. There are even sections where Tepes quotes extensively from letters and journals, including the entirety of a three page letter from Dr. Van Helsing (149-151). For the last seven pages of Track Four, Tepes alternates equal portions of his own account with quoted portions of letters and journals (161-178). Furthermore, he is able to recall exactly a series of headlines from old newspapers, along with the copy of a notable advertisement, even challenging his listeners if they are skeptical of his powers of recollection: "Do you doubt I can remember all these items as they were? Well, I found them memorable. Check your library's microfilm files of the Times if you doubt me" (111).

Personal testimony, in this instance, resembles a database more than a traditional narrative. The distinction between what Tepes "knows" as a subject and the information contained in journals, newspaper archives, and letters does not seem to matter. In other words, Tepes's subject position as an effect of the Dracula Tape is continuous with other databases ordinarily considered to be distinct from personal subjectivity. Lev Manovich defines the "database logic" of new media as antithetical to narrative, but here the magnetic tape subsumes Tepes's personal narrative under broader structure for data, in this case the magnetic tape.[113] Personal memory and database content become one in the same. Understood in this way, *The Dracula Tape* joins a longer trajectory of posthuman thought, articulating nineteenth-century legend to a technological vernacular that anticipates digital culture.

However, this posthuman perspective is not all we gain critically by examining the prominence of magnetic recording technology in the novel. In order to bring about this posthuman sense of metonymical embodiment similar to what Hayles describes in *Ticket*, *The Dracula Tape* relies on the hardware paradigm of the portable recorder/compact cassette. The Dracula tape is both an embodiment of Dracula and an artifact of his identity as a user. Just as it did in *Ticket*, the magnetic cassette implies by its very operation the presence of a user who, as the owner/operator of a consumer-grade piece of electronics, imagines his/her subject position as discrete from the informatic systems engaged by the tape deck—the technologies and artifacts of recording that made 1960s and 1970s portable recording possible. Dracula may be present *through* the found tape, but he is also present *because* of the tape as well. In other words, the tape both stands in for and indexes Tepes's embodiment, paradoxically establishing both his human and

posthuman subject position. Part of the novel's concoction of the mysterious tape in the first place, after all, is to indicate that Dracula really does exist, now available to the technological theater of proof through the artifact of the cassette. The formatting of the tape itself, while bearing the posthuman implications discussed above in its function as a database of history and personality, also resembles a compact cassette available for commercial use. Arranged neatly into tracks that conveniently structure a polished and complete narrative, the novel makes the mysterious tape seem more like the transcript of an audio book than anything else. Understood in this way, the format of the cassette is important to the novel not only as a medium for informational patterns, but also as an icon of personal expression. Like other applications of the compact cassette in the 1970s such as the LP, the mix tape, and personal music collections, the Dracula Tape serves as an articulation of user command over recording technology and audio content that signifies (not replaces) the taste, choices, and identity of the author. This understanding of the tape is appropriate given the novel's emphasis on Dracula's side of the story as an alternative understanding of the gothic legend. Sabheragen's novel, therefore, dramatizes the cybernetic dialectic precisely because, no matter how much Dracula's existence is an effect of the information on the tape, the novel also depends on magnetic recording technology to *produce evidence*. Just as in *Touch of Evil*, the act of recording signifies the imagined discipline of information by an editor into a form that suits his/her purposes. Staged by portable electronics, posthuman informatics are radically inflected by the terms of a consumer technology, which include the idea of a coherent subject as editor/user and the signification of managerial work as a performed separation between technology and

subject. Inflected by personal consumer goods and the implied user position therein, an unequivocal posthuman informatics is impossible.

Situating the act of recording in relationship to the broader revolutions of postwar western thought, Richard Powers's *The Prisoner's Dilemma* uses magnetic recording to demonstrate the recourses available to individuals presented with social and economic models predicated on cyborg science. The novel chronicles the Hobbsons, a family of six living in the Chicago suburbs, and their continued efforts to understand their father's mysterious illness, obsession with human cooperation, and secret project he calls "Hobstown." For years, Eddie Hobson has suffered a number of symptoms that range from neurological to gastrointestinal, and he refuses to seek treatment, even though his condition worsens as the novel progresses. As he grows even more ill, Eddie redoubles his efforts at Hobstown. Parallel to the narration of the family's struggle to understand the disease and the nature of Hobstown, and to convince Eddie to seek treatment, however, are a series of interludes that alternatively tell the history of the Hobson family and an imagined history of Walt Disney's career as a wartime filmmaker in the 1940s. In the latter history, Disney recognizes a key problem in the relationship between individual Americans and the broader war effort: the war is at once all important and completely aloof from everyday life. As a solution, Disney imagines his masterpiece, *You are The War*—a film that mobilizes the fairytale magic of his previous work and combines it with message that will elevate the social consciousness of its audience. He proposes that his film will communicate to his audience: "just how urgent, critical, real, and present the present is, just how central each of them is to the larger picture"(135). Using a labor force comprising largely of Japanese-Americans who would otherwise be interned under

the Relocation Act, Disney begins the construction of an enormous movie set that attempts to replicate Main Street U.S.A. in the middle of the cornfields of Illinois. Cast as the protagonist of this ambitious and unprecedented piece of propaganda is young Eddie Hobson. Disney hopes that young Eddie will represent every American citizen. Eventually defeated by the impossibility of the project, Disney concedes and gives up the production. At the end of the novel, the reader learns that this account is actually the remaining pieces of Hobstown, which turns out to be what no one expected: "two dozen reels of recording tape" that Artie discovers in the attic. The tapes are the product of Eddie's historical research and imagination, recorded over a span of 25 years in the name of a secret construction project.

Central to both the family narrative and the revised history of Disney is the vexing question of how, if at all, does individual action matter in the context of a global system made up of billions of other human beings? As one section of tape grimly observes, "The power of the local voice to tip the curve now seems miniscule, insignificant" (101). The prospect of being one against many, trying to understand what individual choice matters and what its ultimate relationship is to history and social collectives, haunts *Prisoner's Dilemma*. Disney's unfinished *magnum opus,* its attempt to model the United States in a corn field, and Eddie's role as iconic American all attempt to establish some kind of meaningful connection between systems and individuals, between citizens and broader networks of government, economics, and culture.

The salience and agency afforded by liberal humanism disappears in the context of a post-Turing world where information is "the world's crucial commodity"(211). Given these new conditions, the sweeping voice of the Hobstown narrative declares "we can no

longer entrust [information] to individual hands" (102). This position toward regarding information as "crucial" transforms an individual's relationship to government and collectives in general; an individual is too untrustworthy, and the global economy of information too important, for a nation of single subjects to be included in any egalitarian distribution of information. This perception is consonant with the crisis of liberal subjectivity brought on by wartime and postwar information culture described by Hayles:

> Of all the implications that first-wave cybernetics conveyed, perhaps none was more disturbing and potentially revolutionary than the boundaries of the human subject are constructed rather than given. Conceptualizing control, communication, and information as an integrated system, cybernetics radically changed how boundaries were conceived. (84)

This culture of information at once values information and schematizes everything as information. Understanding group behavior through this lens, large-scale cooperation among subjects appears logically impossible. "The Prisoner's Dilemma," the occasion for the novel's title, is a foundational problem in game theory that, through its representation of large-scale cooperation or conflict as an aggregate of individual calculations, synthesizes posthuman informatics more specifically with economic and social theory.

As Philip Mirowski observes of postwar game theory, the Prisoner's Dilemma and other theorized games mark a transformation in economic theory in which the discourses informing economic models shift from physics and chemistry (hence the equilibria imagined by early 20th century classical economics) to the "cyborg sciences."[114] Here,

Mirowski and scholars of posthumanism refer to similar set of scientific practices and cultural metaphysics; cybernetics, computer science, statistical modeling, cognitive sciences, and molecular biology are indicative of a tectonic shift in U.S. culture toward percieving the physical universe as patterns of data. Instead of particles, postwar economic models tend to view subjects as automata, processing nodes for information whose collective behavior can be understood as aggregates of decision trees imagined by computation and logic. A single decision means nothing; iterations of decisions throughout the network do. More specifically, The Prisoner's Dilemma is a scenario in which two prisoners are presented with a set of choices: inform on the other prisoner and go free, or remain silent in cooperation with the other and receive a slightly reduced sentence. Mutual informing, however, will result in the highest penalty for both. Most disturbing about this scenario is the relatively high probability of both prisoners betraying each other in the hopes of personal benefit, thereby damning any long-term prospects of any large-scale cooperation among more than two players. First investigated by the Rand Corporation in the 1950s as a tool for understanding possible nuclear strategies, many disciplines subsequently took up the problem and its potential applications, from evolution to social networks.[115] As Hayles aptly describes the relationship between cybernetic thought, economics, and subjectivity, "If owning oneself was a constitutive premise for liberal humanism, the cyborg complicated that premise by its figuring of a rational subject who is always already constituted by the forces of capitalist markets"(86-87). Information and computation, then, are not just a kind resource, but also, as the work of both Mirowski and Hayles suggests, organizing metaphors for collectives and their management of resources. Eddie's portrait of the world after the Second World

War, therefore, is characteristic of emergent posthuman culture in the mid-twentieth century.

But Powers's novel does not simply articulate the tenets of posthumanism as broadly understood through game theory and Turing's influential work on computation, intelligence, and simulation; it is more of a contemplation of what, if anything, is left for the paradigm of liberal humanism in their wake. Eddie's recording sessions demonstrate an attempt to work through the implications of a posthuman perspective, but these sessions do not just use magnetic recording as an archiving medium for a series of personal meditations. Like Saberhagen's novel, *Prisoner's Dilemma* demonstrates the ability of magnetic tape both to embody and index the existence of its users. When the Hobsons assemble together to listen to the final tape of Eddie's archive, for instance, it is remarkable that he is not with them; he has escaped treatment and run away to Alamogordo, New Mexico. Thus, when the family listens to the final vision of Hobstown, they at once feel their father is present through his voice on the tape but at the same time understand his embodiment as something evidenced by the recordings themselves: "Somewhere in the sedimented ground the releasing key, the cathartic, firsthand knowledge of where they came from, lay buried"(327). The Hobstown tape stands in for the missing Eddie, but it also acts as a relic of his embodiment and activity as social and familial architect.

The relationship between magnetic recording and the broader narrative of *Prisoner's Dilemma* is more sophisticated than that of *The Dracula Tape*, and the novel traces more complexly the dialectic between cybernetic thought and the ideology of management. In addition to magnetic tape's dual participation in both posthuman and human embodiment,

it also exists as technology through which individual subjects can manage history and personal experience against the oncoming cultural regime of posthumanism. The latter is specifically important because of its role in addressing the Prisoner's Dilemma. Eddie Hobbson's infatuation with the Prisoner's Dilemma stems not only from the implications of this scenario about fictional prisoners, but also from how those implications literally imprison its participants (comprised of everyone in the world) within a game that ultimately undermines the efficacy of the actions of individual subjects. The central hope of Hobstown, then, is to articulate some way out of the game, and solve the prison of assured self-interested behavior by locating every individual as a meaningful participant in a broader social collective, not just a node in a network of the doomed. This is the hope of *You are The War*: to instill in Americans the idea that their individuality is the foundation for, not the casualty of, social collectives.

Through magnetic recording, both Eddie and his family produce personal histories that ultimately reduce the prisoner game to a scale manageable to individuals, even though for most of the novel the prospects for escape seem hopeless. Eddie asserts of the game that "even if the game stabilizes with two players, it's certainly hopeless at four billion," but concludes his recordings by attempting to imagine a way to make the game work on a smaller scale (283). The Disney masterpiece falls apart toward the end, floundering on the core realization that collective action on a grand scale, no matter how ambitious and transformative Disney's message may be, is doomed to fail. As a character in his own alternative history, Eddie discovers Disney's Dictaphone recorder amidst the abandoned set and plays back Disney's final message, a message that admits

the defeat of a project dedicated to inspiring cooperation against the odds. Eddie activates the device and Disney's recorder plays back his concession:

> that to make a sensible use of one's reason harms nobody. It is natural for everyone to aid, preserve, and defend his life as far as possible. And this is so far admitted that to save their own lives men often kill others who have done no harm. If this is permitted […] it must certainly be lawful for us to take any reasonable means for the preservation of our own lives (332).

Defeated by both the horrors of the Second World War as well as the dismal odds presented by analyzing populations as automata available to calculation and processing, Disney declares the end of cooperation, insisting that "we are not abandoning anyone here" by resigning to virtuous self interest at a time when individuals and their actions seem not to matter in the context of masses who will not cooperate (332). One vote means nothing against millions.

But Eddie's creation of this imagined defeat in Disney's life is an opportunity to culminate the narrative in a way that shows players a way out of the prisoner's dilemma. Where attempting to understand cooperation as a game with four billion players undermined the efficacy of individual agency and was the occasion for Hobson metaphysical crisis, Eddie records over Disney's final message to model a way to make cooperation matter. Shifting the scale of the game down to a manageable level, Eddie poses a new scenario: "Let's start again, from scratch. Let us make a small world […] since we screw up everything larger. Let's model the workings of an unremarkable, mid-sized family and see if we can get it right"(333). In this scenario, individual subjects matter so long as the scale of the game does not expand to include everyone. In other

words, the same attention to scale that allows the ideology of management to use gadgets as an interface between personal and cybernetic scales manifests in Eddie's reconfiguration of the prisoner's dilemma on audiotape. Eddie accomplishes this reconfiguration by switching the narration's focus from the broader tectonics of history to the history and significance of his family. That this transformation takes place on audiotape is not arbitrary or simply an update of the much older concept of the paper journal; Eddie, magnetic tape, and recorder cooperate to transform a systemic crisis of subjects and information-age technologies to the relationship between user and device. Eddie's comparison of his personal dictation sessions to a man who cured himself of substance abuse "by holding a dialogue between his healthy personality and his ill one" underscores how he sees the dictation recorder as a crucial tool for managing who he is, what he has gone through, and what he currently experiences.

By speaking into the various recording devices he has employed over the years, Eddie attempts to manage history and his identity by reducing both to the scale of a one-on-one conversation. When listening to the Hobstown tape, Artie notices the sounds of "Pop stopping the motor, rewinding, reviewing, rerecording his tale countless times, until the results satisfied the famous perfectionist. The famous prisoner"(317). While this constant rerecording of spoken narrative is not identical to the cut up method articulated in Burroughs's work, it shares the assumption that even though history, identity, and even embodiment (vis a vis tape sessions as medical cure) can be manipulated as information, the act of editing that information allows for an appropriation of these recording devices for humanist and psychological self-preserving ends. Editing insulates user subjectivity against dissolution into nothing more than information or computation. What the

recorder allows that a paper journal could never, then, is the ability to parse informational content from a user identity imagined as discrete and salient. To solve the problem posed by posthuman economic and social theory, Eddie must invert Turing. Instead of using information technology to establish information as the most crucial commodity of the postwar world, he uses the recorder as a key tool in performing his subjectivity as something other than information. Instead of a doomed automaton in an all-encompassing game, his revised history proves by its very existence the power of individual subjects to reimagine the terms of the game to a scale manageable by individuals, illuminating a new future where liberal subjects reassert control over parts of the network that then allow for reclaiming the primacy of the human subject as a construct of political, economic, and metaphysical consequence. His formulation of Hobstown, therefore, is doubly curative. It at once imagines a solution to the prisoner's dilemma through a six person family and performs it by reducing the complexities of history and identity to the relationship between a user, his recorder, and his database of tapes. Recording his Hobstown narrative allows Eddie to offer something against the posthuman, a scale comprehensible and reassuring to individual human subjects, both socially and informatically. That the novel ends with the rest of the Hobson family taking up the task of continuing Eddie's tape sessions galvanizes their participation in the new Hobstown. This time, instead of imagining a message that will affect an entire social collective, this Hobstown sees the gadget and family converge as technologies of comprehension in a posthuman time: it substitutes the systemic scale of cybernetics with that of a family narrating its own history together in front of a tape recorder.

The selected arc of fiction about magnetic recording I have just traced discloses a crucial ambivalence in the postwar American cybernetic imaginary. Not only does the field of consumer hardware compromise imaginations of cybernetic systems stylistically and informatically through the ideology of management, it also constitutes its own set of hopes for the future of liberal subjectivity in the face of a new metaphysics of information, embodiment, and identity.

III. Conclusion: Replication and Recording

I want to return to the question posed at the outset of this chapter, "what does it mean to record and be recorded magnetically—on a format which allows recording, re-recording, mixing, and copying?" It is clear that recording can be the occasion for cybernetic technologies to considered dialectically: ubiquitous information technologies enable posthuman perspectives, but they also insulate subjects against the implications of posthuman thought because they frame concerns of information, embodiment, and identity in simplistic terms of control and personal identity. In each work of fiction, electronics transform imaginations of cybernetics because they are part of a system of commodities. Ownership of electronics and usership of electronics converge in a powerful formation*:* that a piece of information manipulating technology can belong to an individual subject is the basis that allows liberal subjectivity to survive the posthuman age. And though posthuman economics may see subjects as always already constituted by capitalism, consumer electronics mobilize the trope of the gadget in order to preserve liberal concepts of embodiment, ownership, and agency. What magnetic recording signifies in these texts—among a number of posthuman axioms—is also the ability of

users to deploy personal hardware to distinguish between original and copy, between recorded and recording.

Emergent in these texts, therefore, is the desire to understand *recording* as something distinct from *replication*. Where replication confuses the difference between copies and equates them on the level of informatic pattern, recording narrates the distinction between original and copy. Within the context of personal electronics, the task of recording is to perform the authenticity of the original thing recorded. It is only through this distinction that user subjects can be imagined as something other than informatic patterns, because it establishes a mode of being that cannot be reduced or comprehended purely in terms of information. A magnetic recording is an artifact of managerial work, a metonymical representation of a field of activity and cognition that capitalism embraces as a means to promote the parameters and efficacy of the consumer subject.

This separation of recording from replication complicates the posthuman metaphysics of virtuality and cybernetic systems. If every copy is understood to have an antecedent, constellations of information and processes cannot be understood as mere information and processes. Recording narratives demonstrate that recording is not a phenomenon to be supplanted by cybernetic replication over time as we pass through the transformations of postmodernism; it recurs throughout the twentieth-century culture of the US as a means to reclaim "the real" purported to disappear in the Baudrillardian media age. While Baudrillard maintains that postmodern practices of simulation eliminate the distinction between reality and representation, recording provides a means to split the simulacra into real and copy, not the real and replica.[116] Thus, in recording

narratives, recording is the managerial work that not only restores subjects, but also the metaphysics that enable liberal subjects to exist in the first place. Like Vargas slogging through the marshes of the borderland industrial zone with a tape recorder, gadget users in recording narratives use the creation and archiving of copies as the occasion for, not the unraveling of, their agency as human subjects. Through the recorder, Vargas restores not only his credibility as a police officer, but also his masculinity that was damaged so extensively by Quinland's framing of his wife in a narcotics scandal.

As long as consumer hardware frames the terms of replication and cybernetic systems, the concept of recording will remain a core activity for imagining future configurations of technologies and subjects. Furthermore, by studying instances of recording, one can trace the ways in which consumer technologies are not simply represented, but also remediated in the posthuman imaginary. Namely, recording and its metaphysics endure even in the absence of explicitly represented personal electronics or novel devices that do not directly mimic known technologies. The concept of recording serves as a useful replacement for replication in narratives that invoke cybernetics but do not upset the metaphysics of liberal humanism. As we shall see in the subsequent two chapters, gadgets—even when they are invoked and not explicitly present—depend wholly on the fundamental distinction between recording and replication in order to imagine a hyperhuman future.

CHAPTER 3: CYBERPUNK WITHOUT CYBORGS: STYLE AND GADGETS IN THE EARLY FICTION OF GIBSON AND STEPHENSON

Gadgets are both an occasion for and a specimen of imagined relationships between humans and non-humans. Given this perspective, foundational texts of the cyberpunk subgenre, with their consistent vision of human and technological activity redefining each other, showcase the American Gadget as a way to both celebrate novelty and stabilize that novelty into new but not radical configurations, ones where the concept of the human agent remains intact or even amplified. To this point, the new configurations of humans and technology offered by cyberpunk are not necessarily cybernetic, even if the genre's name happens is derived from the term cyborg. Through the study of gadgets, cyberpunk is less a genre about computing and the meaning of human intelligence and more a body of literature obsessed with the relationship between technology and the integrity of human expression. By reinscribing the liberal-consuming human subject discussed in the previous chapter, gadgets are constitutive of both cyberpunk's vision of the future and its formulation of technology and style. Recognizing gadgets in cyberpunk reveal the genre's fascination with the future survival of contemporary terms of human social expression—style, consumerism, individuation, "cool"—alongside its vexed ambitions of radical human/technological metaphysics.

Through the fashioning of personal spaces and appearances in both social and digital networks, style functions in cyberpunk as a critical activity through which traditional humanity adapts to the advent of ubiquitous computing and artificial intelligence. While it is true that cyberpunk showcases a variety of biomodifications that humans take on, these so-called "cybernetic" transformations are merely cosmetic.

Underneath the posthuman costume, the consistent emphasis on style focuses the genre away from any rigorous meditations on transforming humanity. Instead, the real concerns of cyberpunk lie with using technology to unleash the full creative powers of human beings (that is, human beings in the liberal humanist sense discussed throughout this project). Instead of cyborgs, cyberpunk is fascinated with the continuity and amplification of human identity because of, not despite, a digital future of machines and computers.

To produce this continuity and amplification of human beings, cyberpunk uses personal electronics and digital devices as utopian technologies of style. In futures where computers threaten the supremacy of human intelligence; where the projects of international culture, urbanization, and the environmental preservation have failed, personal electronics serve as the means through which human beings may still cultivate an identity and pleasure as a species. Concentrated around personal electronic technologies, style in the cyberpunk age ensures that individuals can co-opt a digital age in order re-imagine the world in terms of human expression and consumption. Seen through the lens of consumer electronics, cyberpunk imagines strategies to protect and represent a fundamental creative essence of humanity that evolves, not expires, in a cybernetic age. This approach to technology in cyberpunk takes more seriously the style culture invoked by the use of "punk" instead privileging instances of "cyber"; because they are always being updated or adjusting to their owners, electronics liberate humans to be more human through the performance of dynamic personal style.

In this chapter, I will describe what I term "cyberstyle," a mode of expression in which personal technology and personal style are conflated so that technologies serve to promote individuation, and not simply accomplish the tasks they are literally designed to fulfill. Next, I examine the ways in which cyberspace acts as a primarily visual medium—not an information network—that contributes to the style-identity of its users through its consistent activity as a stylistic "counter-system." I draw on the work of Alan Liu and his historicization of "cool" in order to explain the style value of repurposing productive technologies toward entertainment and spectacle. Finally, I demonstrate that specific personal electronic devices in cyberpunk wield so much intelligence relative to their size that they serve as idealized culminations of gadgets. In the performance of what I call "always adjustment," these devices' incredible handheld power ensures that they accommodate their users in novel and exciting ways, leaving them perpetually adjusted to and oriented in an otherwise dizzying environment. Paradoxically, however, this adjustment testifies to the ability of their human owners, not the technology itself, to adapt to the so-called "posthuman" world. The concept of the ultimate gadget, fraught as it may be with contradictions and delusions, is attractive enough to repress the cyborg implications of elaborate feedback loops between user and technology present in much of cyberpunk. In other words, by appealing to and amplifying a form-factor that is built from the stylistic/technological sensibilities of the later twentieth century—the pocket-sized device—cyberpunk imagines digital technologies within the parameters of twentieth-century gadget culture despite the posthuman implications of sophisticated and dynamic digital technologies.

Ultimately, critical responses to cyberpunk since the 1980s—framing this writing as either a radical genre espousing posthuman ideologies or a hegemonic genre obsessed with digital transcendence, patriarchy, colonialism, and capitalism—do not account for the utopian production of human-making technologies through cyberpunk fiction. Crucially, cyberpunk discloses fundamental hopes and desires Americans invest in electronics for the salvation of their individuality, creativity, and personal style in the face of ubiquitous networks, computing, and intelligence.

I. "Technical Boys" are Individuated: Gibson and Stephenson's Cyberstyle

In her 1996 evaluation of William Gibson's fiction, Kathryne Lindberg concludes that in Gibson's cyberpunk "the character is less important that the media of transportation, communication, and reproduction."[117] Lindberg's point of analysis is insightful, namely, her focus on the *importance* of human characters amidst the technoscapes of Gibson's cyberpunk touches on the driving question of the genre: what happens to human beings if computers become truly ubiquitous? And while Lindberg supplies convincing reasons to claim that characters are less important than technologies in Gibson's work, her assessment does not fully account for the fact that, despite Gibson's meticulous attention to digital and cybernetic technologies, his work relies on the appearance and experiences of its characters to give those technologies social meaning within the context of his speculated futures. Namely, those technologies are part of a greater style system. Gibson's work does not just showcase novel cybernetics and computers, but also speculates on the fate of human culture when it is inundated by those novelties. Instead of humans disappearing from importance, personal style—the

semiotic impact of the objects with which people choose to surround themselves—assumes critical importance. Emphasizing the function of style in these texts, I would like to frame my readings of cyberpunk by reformulating Lindberg's assessment: Gibson's characters are not less important than technology; technology is important in Gibson's work precisely because of his interest in characters and their pronounced sense of personal style. Without these fantastic technologies, there would be no unique future-age style—there would be no punk in cyberpunk. Technologies act as the very means of individuation as (wo)men make and remake themselves through their electronic devices. Further working to emphasize the individuality of his characters, Gibson's technologies also locate people within the vast networks of cyberspace and preserve their integrity as subjects in an environment that sometimes appears as pure information. As we shall see, human ownership and mastery of personal data technologies is central not only to Gibson's aesthetic of futuristic glamour and personal accomplishment, but also to the broader genre of cyberpunk as well. From Gibson's work we can see that much of cyberpunk is no so much enamored of the concept of the cyborg in the sense outlined by Haraway and other scholars of posthumanism, integration of persons and technologies such that the traditional hierarchies and separations between the two are destroyed, rather, cyberpunk remains captivated by the idea of human beings maintaining their integrity as aesthetic and creative agents. Creative deployment of technology individuates characters socially and stylistically, providing an identity for them that spans both social environments and technological networks. And in this genre, there is often little distinction between the two.

To examine this tendency in Gibson's work, I turn to the text that Lindberg addresses in her critique, "Johnny Mnemonic." The story defines its characters through the technologies they own and employ, and positions digital storage technologies as crucial to the individuation and liberation of Johnny. The story begins with an object as Johnny's central focus: "I put a shotgun in an Adidas bag […] not my style at all"("Johnny Mnemonic," 1). From its advent, then, the narrative tightly links technologies with personal identity. So important is equipment to Johnny's sense of individuality that he goes through great lengths to fashion a disguise using crude and old-fashioned gear: "If they think you're technical, go crude. I'm a very technical boy" (1). His disguise does not work, and Ralfi is more than prepared for Johnny's shotgun surprise, but Gibson-cum-Johnny's elucidation of personality through gear continues nevertheless. Molly Millions enters the story as a "low feminine voice" and a set of "mirrored glasses" (5). Here and throughout Gibson's fiction, Molly's lenses are not only a prominent feature of her appearance, but also characterize her as ruthless, mysterious, calculating, and unique. Next, Ralfi's bodyguard sustains a messy wound from Molly's second defining piece of equipment, her razor fingernails. Recounting her lightning quick movements, Johnny asks "hadn't her hand been empty?" wondering about a piece of specialized equipment that must be there but he cannot see. Curious about glasses that are not glasses and an empty hand that is not empty, Johnny's first impressions of Molly define her uniqueness as a character through her mysterious implants. Her gear is the most important aspect of her self-definition, both in Johnny's and her own eyes/lenses. Through equipment, style is transformative of physical identity

even as if it seems to express an internal psychological self. Thus, in this cyberpunk future, technologies serve as metonymies of, not substitutions for, human characters.

This mode of character definition also extends to biological modifications, technologies that are not obvious as discrete pieces of hardware. Ralfi, for instance, is defined primarily by his decision to wear a face that does not belong to him: "he'd worn that once-famous face of Christian White for twenty years." Johnny makes it clear that he sees the face as a piece of equipment that belongs to Ralfi but is not Ralfi: "Ralfi's eyes lived behind that face, and they were small and cold and black"(3). Although Johnny calls constant attention to the fact that Ralfi's Christian White face is borrowed, this separation between Ralfi and the vat-grown face he wears emphasizes that the real Ralfi is no different from Molly and Johnny; his selection and deployment of technologies are crucial to his own self-styling. Ralfi's bodyguard, Lewis, gets similar narrative treatment, "looking like something built from a kit"(3). Notably, however, both make blandly predictable style decisions, making their blasé sensibilities, not their surgical alterations, a detriment to their individuation.

What Johnny and Molly are up against in *Johnny Mnemonic*, then, is not simply the Yakuza, but anonymity as well. Characters like Ralfi and Lewis use the technological wonders at their disposal to produce boring, monotonous, or predictable configurations of owner and technology—and the worst thing to be in Gibson's fiction is boring and uncreative. Johnny implies as much in his disgusted assessment of the Drome: "The Drome stank of biz […] Muscle-boys scattered through the crowd were flexing stock parts at one another and trying on thin, cold grins, some of them so lost under superstructures of muscle graft that their outlines weren't really human"(2). This

description turns stylistic conformity into an act of grotesque self-mutilation. The "muscle boys" take on a monstrous valence as they walk about the crowd as copies of each other, unaware of how ridiculous they look in the condescending gaze of the narrator. Though deadly, even the Yakuza assassin is as blandly predictable and mass-produced as the muscle boys; Molly informs Johnny that the killer "was mostly grown in a vat in Chiba City"(8). And though Molly immediately discloses through showcasing her custom fingernails that she has "been to Chiba too," her difference from the assassin is clear: Molly uses her modifications and equipment to style herself as a singular individual, but the assassin uses them to be part of a larger assembly line of manufactured flesh. In this technological world where there is remarkable potential for self-fashioning, to use generic technologies or to use technologies generically is to become anonymous. To become anonymous is to lose the most precious aspect of being human in Gibson's fiction: a sense of personality and individual style represented by graceful integration of "meat" and technology.

Although Johnny can style himself through dark clothes and a retro shotgun, his brain implants deny any efforts to be comprehensively self-styled. He lives in a data-driven economy and culture, and his implants that blackbox data make sure that, in a world of tools and users, he exists as a tool. On the one hand, Johnny takes a certain "pride in profession," a confidence in his neuro-electronic ability to harbor secrets securely. On the other, however, his identity as a "technical boy" is at odds with how his hardware forces him to make a living as a data mule; he'd rather be using tools as opposed to being implemented as one. As a walking hard disk that cannot access itself, Johnny not only finds himself in danger, but also in the technoculturally humiliating

position of carrying information that he does not actually *know*. It is this inverted relationship of mind and information that drives Johnny's desires to escape his implants. Though it makes little practical sense to pay someone to keep a few megabytes of valuable data in his cranium when a local storage option is available, Johnny's character is really an experiment carried out within fiction, a way of entertaining the idea of renting out one's brainspace for commercial use. The result of that experiment, the consequences of a paradox that sets professional pride in technological savvy against the phobia of being used by technology, is a Johnny Mnemonic who needs to regain control of the hardware and software in his head.

In light of this internal battle, Johnny's actions in the story are all part of a quest to regain his sovereignty as a technology-user and establish control over the computer chips implanted within him. Without this control, he begins the story hunted for the information he contains but does not know or own. But when he finally hacks his neural implants, he ends as a moneyed data trafficker who reclaims his memory for profit:

> And we're all making good money, better money than I made before, because Jones's Squid can read the traces of anything that anyone ever stored in me […] we're learning a lot about all of my former clients. And one day I'll have a surgeon dig all the silicon out of my amygdalae, and I'll live with my own memories and nobody else's, the way other people do. But not for a while […] It's educational, too. With Jones to help me figure things out, I'm getting to be the most technical boy in town (23).

By tapping into the government hardware of Jones the dolphin, Johnny reverses his status in the cyberpunk information universe. Not only has Johnny reclaimed the cerebral real estate in his skull and subverted the microchips that placed him in danger, but he has also set two important goals that define the happy ending of this story: he will one day "dig all the silicon" out of his brain, and he will continue his technological training so that he can become "the most technical boy in town." With this closing statement, Johnny asserts that he will master technology as he purges any devices that interfere with his ability to "live with [his] own memories." Asserting his personal identity, returning to a state of uncompromised human flesh, and becoming an adroit technician go hand in hand in hand with his quest to be an individual human being that resembles the consumer subjects of twentieth-century gadget culture. Turning on both his former masters and his memory regulation chips, Johnny now controls information instead of the other way around. Individuated, in control, and in style—keeping company with a counterculture gang and a beautiful assassin—Johnny is free to ride off into the smoggy sunset of the cyberpunk future.

Crucially, his recipe for success looks less like a fundamentally transformed cyborg existence and more like a revamped anti-hero from twentieth-century heist cinema. Rugged independence and personal resourcefulness dictate the appropriate control of human subjectivity and technology. Though he has computer chips in his brain, Johnny's style requires that he have his own memories, his own data, and his own interface, that he grows, in other words, from a "true" cyborg to a human being whose authenticity is derivative from the same liberal consumerism that drove sales of thermoplastics and tape decks. Setting the standards for future cool, Johnny's obsession

with preserving his human identity as an information-age gangster who can coyly conclude, "I'm becoming the most technical boy in town." Though new biomodifications and information technologies take up much of the narrative's attention, the most important issue at stake all along in "Johnny Mnemonic" is Johnny Mnemonic.

This synergy between personal style and individuated technologies persists throughout Gibson's work. Unique and interesting personal computing technologies like Molly's lenses (which are part of her dynamic heads-up display) and Johnny's repurposed brain implants recur in devices like Case's customized cyberdeck in *Neuromancer* (sent to him courtesy of Wintermute via Korto), Kumiko's palm sized "ghost" AI unit in *Mona Lisa Overdrive* (customized by her father specifically for her), Bobby's blackmarket Russian program in "Burning Chrome," and even the digital lab of *Pattern Recognition* that renders and distributes fragments of footage from the secretive Russian artist. In each instance, the technologies are not simply showcased as interesting novelties; they constitute the overall style and power over information of the characters who employ them. In many ways, Gibson tends to play dress-up with his characters, paying close attention to the materials, designers, and look of their clothing, as well as equipping them with technologies that will help actualize their fundamentally consumerist desires in the new information age. Control over one's appearance is one thing, but in the twenty first century one's control over data is the next necessary component of a distinct personal style. Gibson's description of Casey's possessions from "Winter Market" demonstrate the prominence of both in his work: the beginning of the story features a detailed description of Casey's custom Japanese Ginza leather shoes, but his identity as a character does not solidify until the story introduces his custom video

editing rig that can record dreams onto videotape. Information and technology, like clothing, serve as a means through which Gibson's characters celebrate and showcase their human creativity and individuality. Indeed, in devices such as Molly's lenses, the distinction between digital technology and fashion has become mutually constitutive. Ultimately, these devices and modifications have not stifled what makes humans human; they have provided even more ways to put their fundamental qualities on display.

This connection among style, humanity, and technology use/ownership is not limited to Gibson's work alone. Neal Stephenson's *Snow Crash* similarly employs digital devices as a means to throw the human individuality of his protagonists into sharp relief against the drone-like crowds of the novel's dystopian future. In *Snow Crash*, people that function as undifferentiated masses constantly surround Hiro and Y-T. From the stupid drivers of the "bimbo boxes" on the urban highways to the Ashera cult members controlled by radio frequencies, individual personality seems scarcer in this future dystopian world than a forest.

The opening scene of Stephenson's novel establishes the potential of digital technology to unleash and express human personality in a monotonous dystopia. Hiro's pizza delivery car is part of a larger digital network dedicated to pizza circulation:

> Each pizza glides into a slot like a circuit board into a computer, clicks into place as the smart box interfaces with the onboard system of the Deliverator's car. The address of the caller has already been inferred from his phone number and poured into the smart box's built-in RAM. From there it is communicated to the car, which computes and projects the optimal route on a head's up display, a glowing

> colored map traced out against the windshield so the Deliverator does not even have to glance down (*Snow Crash*, 4).

This level of technical precision for delivering pizza is certainly comical, but for all of the computer intervention in this process, human agency remains a crucial component ofc the pizza delivery routine. This is not effortless labor despite the fact that routes are automatically computed and "the Deliverator does not even have to glance down" to navigate his digital feed. Given the technology posited by this novel, it is just as conceivable that pizza delivery could have been fully automated, but *Snow Crash* uses the pizza delivery scene as a way to demonstrate that, in this world, human agency still matters. Instead of making the delivery process relaxed and automatic, computer technology frees Hiro to focus on the performance of his trademark intensity, technical skill, and personal style:

> The Deliverator is a Type A driver with rabies. He is zeroing in on his home base, CosaNostra Pizza #3569, cranking up the left lane of the CSV-5 at a hundred and twenty kilometers. His car is an invisible black lozenge […] A row of orange lights bubbles and churns across the front […] The orange light looks like a gasoline fire. It comes in through people's rear windows, bounces off their rearview mirrors, projects a fiery mask across their eyes, reaches into their subconscious, and unearths terrible fears of being pinned, fully conscious, under a detonating gas tank, makes them want to pull over and let the Deliverator overtake them in his black chariot of pepperoni fire (7).

Hiro's technologized approach to pizza delivery is decidedly more dramatic than it has to be. Instead of making things easier, digital technology has created a fast-paced

environment in which the elite thrive and all others struggle. In this context, automated pizza systems do not occlude the importance of Hiro as a driver; they provide the means and occasion for his character to emerge: an intimidating, jet black car, special lighting effects, and professional-grade driving skills emphasize his distinction and supremacy. Hiro not only proves that he is qualitatively different from the "retards in the bimbo boxes" who are cursed to be "random" and "indecisive"(8), but he also demonstrates that, thanks to digital assistance, he inhabits a different kind of time. Always oriented and in control, he feeds off frenetic activity and constant stimulation, and the devices around him—from his car stereo to his personal computer— oblige him at every turn. Everything accelerates to a seemingly untenable pace that only the elite (such as Hiro) can maintain. With such an emphasis on what makes him unique, Hiro is no cyborg, no more than a race car driver is a cyborg because s/he uses a car. His urban/digital/ninja badass aesthetic would not be attainable without digital technology. Technology is not simply the direct object of his sense of style; it is the organ through which he articulates personal qualities that would not even be legible without an ubiquitous computing environment. Defined by both his driving and his drive against a backdrop of drone-like people who might as well be machines, Hiro is a sovereign human agent, because of, not despite, the devices in his employ and environment. His all black, reflex-twitch, gasoline fire style is an artifact of his (and Stephenson's) decision to invest in the concept of the human subject and to use digital technologies *as a means to amplify the individuation and character of that subject*.

Furthermore, Hiro's personal hardware ensures that his integrity as an individual persists even in the Metaverse. By providing a local database and processor, as well as a

laser-imaging rig,[118] his portable computer can store and project his customized avatar into the data networks he accesses. Not every client on the Metaverse gets this privilege, as readers learn early on about the consequences of using public hardware: "Besides, this guy's using a pay terminal—which he must be, to judge from the image quality—it can't jazz up his avatar. It just shows him the way he is, except not as well"(41). When accessing the Metaverse, users on public computers are condemned to live pixilated and unexciting digital lives. They look like everyone else on a public terminal; not because their avatar is generic, but because the hardware they use is not able to produce an image that effectively communicates any personal sense of style or personality. Low resolution means low individuation. On the other hand, Hiro's computer provides him the opportunity to flex his technical expertise and produce a different kind of avatar altogether:

> Hiro's avatar looks just like Hiro, with the difference that no matter what Hiro is wearing in Reality, his avatar is always wearing a black leather Kimono […] it takes a lot more sophistication to render a realistic human face than a talking penis. Kind of the way people that know clothing can appreciate the fine details that separate a cheap gray wool suit from an expensive hand-tailored gray wool suit (36).

Hiro's avatar is unique because it looks just like Hiro, right down to the last particle. The only exception is that, unlike Hiro, his avatar is always well dressed. With no need to worry about clean clothes, expenses, or work, the custom avatar is free to be a stylistic ideal. In the Metaverse, the better command a user has over the hardware and software necessary to create and present an avatar (either through buying an avatar or making

one), the more individuated and unique the avatar. "Clints" and "Brandys" look better than public terminal avatars, but they are low cost, out-of-the-box models that many people own and use (37). This kind of ubiquity is frowned upon by the aesthetics of the Metaverse, prompting Hiro (one of the founders of the Metaverse) to think dismissively to himself "there are enough Clints and Brandys to found a new ethnic group"(38).

Crucially, no one in the Metaverse spends a lot of time and money to produce an avatar that will look like everyone else's. Hiro's computer, then, allows his Metaverse identity to be both unique (customized through careful construction) and persistent (saved in his computer's database). He "exists" as a discrete individual both on the roads and in the fiber optics of the Metaverse. Furthermore, Stephenson's paralleling of avatars to fine clothing, Hiro's metaphoric "expensive, hand-tailored gray wool suit" discloses even further how closely connected digital technology and personal style are connected in cyberpunk. This obsession with the details of customized appearances—from real clothes to rendered ones—echoes Gibson's own fascination with not only what new technologies will do, but also what they will look like. In both physical and virtual reality, digital technologies enhance style decisions and meticulous self-fashioning, defining the laws and cyber-systems of cool.

Some of the foundational texts of the cyberpunk genre, then, seem ambivalent about what exactly a cyborg is. While it is clear that the limits and definitions of humanity have been thrown into question by the prevalence of biomodifications, artificial intelligence, brain implants, and virtual realms, what emerges from the crucible of doubt is not a posthuman, but an ultra human. In the cyberpunk context, more technology means more freedom to play, which makes a world with ubiquitous digital technologies

and media an ideal place to advance the personality and style that make humans unique. from computers. The cyborg of cyberpunk may be immersed in technology, but the image of the human/computer hybrid works as more as a grunge-punk-digital chic than a new posthuman metaphysics. With humans still defined and located (both socially and digitally) by their stylistic choices and their personal hardware, the shopping mall of humanity still exists in this genre; it just features newer and more exciting stores from which to buy.

II. Problems with Parallel Worlds: The Style Value of Cyberspace

The concept of "cyberspace" is one of the most striking features of cyberpunk as well as one of its most enduring memes in western culture. Although Gibson and Bruce Sterling first brought the term to popular fiction in the 1980s, the concept of a virtual reality—whether it is a simulation-based immersive entertainment module or an autopoetic and interactive digital world—appears frequently across the various texts of the genre. These environments are so immersive that it is not uncommon for the so-called "real world" to be infected by the very simulations for which it provides electricity and server space: *Snow Crash* and *Synners* are two of the most prominent examples of this kind of colonization. This recurrence of incredibly comprehensive simulations, where delineations between the physical and digital worlds disappear, creates the impression that the most fundamental unit of reality (real, simulated, or otherwise) is information. The potential of this real/virtual crossover for producing a sea-change in western thought has been well documented (Hayles, Haraway, Mark Hansen, et al.), as has its tendency to reproduce the western thought it supposedly tries to usurp (Hayles,

Robert Markley, Katie Hafner). Given its politics and obvious anticipations of the World Wide Web, it should come as no surprise that cyberspace is most often viewed as an anticipation of the Internet. But the politics and structure of cyberspace are not just a prototype of the World Wide Web, and they are not limited to alliance or enmity with Cartesian metaphysics, colonialism, and capitalism. Departing from this mainstream approach to cyberspace, this section will consider cyberspace as a utopian visual medium, one that uses brilliant visuals as a way to make style the telos of digital media. Cyberspace is not concerned with elevating style over substance or even substance over style; it is concerned with style *as* substance. The various renditions of cyberspace in cyberpunk fiction share a consistent desire to represent concepts such as human consciousness, computer programs, and massive stores of data with such spectacular visuals that users experience a thrill in excess of understanding the concepts themselves. Understanding a dataform through visualization is one thing (and can be as underwhelming as staring at a picture of a row of file folders), but seeing it as a tall spire with neon effects is another altogether. Cyberpunk invests in the electronics that host and access virtual worlds a unique hope to show us cinematically what the cinema cannot; to record and play back content that a normal video could never could; to showcase in rich visuals the digital world of computers that is by its very nature resistant to cinematic representation. In this respect, cyberspaces are *optitopias*—places where incredible powers of visual representation are both the substance and the purpose of those places' existence.

Recognizing optitopias in cyberpunk is crucial to understanding their relationship to style and consumption. Relative to their contents, cyberspaces suffer from an

embarrassment of visual riches. So spectacular are the visual transformations wrought by cyberspace—presenting unfathomable amounts of data as a psychedelic landscape, for instance—that cyberspace ceases to be concerned primarily with presenting information for practical purposes. Although the visuals of cyberspace serve some practical ends, fictional cyberspaces are so concerned with visual entertainment that they constitute a "counter-system" as described by Dick Hebdige, in which the consumption of a given commodity goes against the grain of its intended purpose.[119] Because cyberspace is first and foremost optitopic and obsessed with scintillating visuals instead of moving and storing information, users engage in a counter system nearly every time they access cyberspaces. To sketch this fundamental connection between style and cyberspace, this section will first detail the optitopic tendencies in both Gibson and Stephenson's versions of cyberspace, highlighting the ways in which both authors make visualization an end in itself. Then, it will explain the ways in which these optitopias form permanent digital counter systems that, by their very construction, shape the style of users. Hackers rarely get lost in cyberspace; instead, they often seem to end up finding and refining their individual styles.

In *Snow Crash*, the Metaverse demonstrates the optitopic tendencies of cyberspace clearly. As a digital network, the Metaverse seems to have limited capabilities; as a visual environment, however, it outperforms any media of the 1990s. Initial descriptions of the Metaverse emphasize its technical underpinnings in mathematics, computers, and software, but the most enduring aspect of the Metaverse is its visually brilliant, simulated landscape:

> For the Americans, it's party time, and they are looking like just about anything a computer can render. The moment Hiro steps across the line separating his neighborhood from the Street, colored shapes begin to swoop down on him from all directions, like buzzards on fresh road kill […] A passing fighter bursts into flames, falls out of its trajectory, and zooms directly toward him at twice the speed of sound. It plows into the Street fifty feet in front of him, disintegrates, and explodes, blooming into a tangled cloud of wreckage and flame that skids across the pavement toward him, growing to envelop him so that all he can see is turbulent flame, perfectly simulated and rendered (38).

The most striking thing about the visuals in this passage is not their brilliant detail, massive scale, or simulated proximity, but rather how much they are taken in stride. Hiro doesn't panic, nor is he surprised at the streaking lights and oncoming flames; all of this is just part of another day in the Metaverse. The "perfectly simulated and rendered" images are of higher quality than anything the cinema could produce, and their ubiquity upgrades and remediates the non-narrative spectacle of Tom Gunning's "cinema of attraction"—a series of visual wonders delivered without attention to narrative sequence—and make it part of the very fabric of the Metaverse's simulated reality.[120] 1980s action cinema, which is part of cyberspace's antecedent imagination, pales in comparison to the wealth of visual activity presented here. Its special effects derive from, bring together and amplify the explosions of *Die Hard* and the visual wonder of *Tron*. There is never a shortage of interesting things to look at in this cyberspace. And that this opulent dreamworld is piped directly into the eyes via a set of laser-imaging goggles

further exaggerating how literally optitopic this simulated space is. Above all things, the Metaverse is a playground for the eyes.

Gibson's rendition of cyberspace is, at base, no different. The "matrix" as rendered by Gibson is an opulent landscape of information. Described famously in both *Neurmancer* and "Burning Chrome" as a "consensual hallucination," Gibson's virtual space is not so much inhabited as it is ogled. Users trade in their goggles for electrodes attached to their foreheads, but even though no one sees Cyberspace with their eyes, the fundamental optics of the place still frame digital content as visual spectacle. Not only do formerly invisible data become visible and confusing networks spatially intuitive; what was inert and technical becomes scintillating and spectacular. The result is the creation of a brilliantly rendered space when something much simpler would have sufficed—no matter how many characters throughout Gibson's works insist on the necessity of the matrix, there is simply no practical value to many of its visuals. The matrix isn't just serviceable; it is positively thrilling. In *Neuromancer*, for example, the vast data networks of the east coast sprawl flash into Case's vision like a crazed electrified cityscape:

> And flowed, flowered for him, fluid neon origami trick, the unfolding of his distanceless home, his country, transparent 3D chessboard extending to infinity. Inner eye opening to the stepped scarlet pyramid of the Eastern Seaboard Fission Authority burning beyond the green cubes of Mitsubishi Bank of America, and high and very far away he saw the spiral arms of military systems, forever beyond his reach (*Neuromancer*, 52)

This is the reader's first exposure to the "matrix" in the novel as focalized through Case. In testing out his new cyberdeck and neural connections, Case already knows the lay of the simulated land, but he is elated to return. The space of the matrix is persistent. The landmarks that Case experienced in previous trips to the matrix still reside in the same locations relative to other landmarks, and its spatial arrangement is familiar enough to be called "home." Some of the most abstract and incomprehensible aspects of global capital and the information age, the gigantic stores of data that compose bank accounts, financial systems, and resource grids, don't look abstract and incomprehensible at all. Instead, they behave in the matrix like the iconic skyline of a famous city, burning in fixed arrangement in simulated darkness. What is remarkable about this cyberspace, what makes Case cry with relief when he recognizes it, is not that all this data exists or is fully networked and accessible to anyone with the passkey or skills, but rather, that all this data is represented as a stable geometry that can be seen as "home." Because Case experiences the matrix as a set landscape with appealing visuals, he can establish an emotional connection to it. Here, like the Metaverse, Gibson's matrix far exceeds what is needed to access and use data effectively; the place is more about entertainment and emotions than utility. The matrix does not just represent data; it transforms it for consumption. Given that the brilliant images of the place have a life and appeal all their own, much has been added. There is certainly more information in the matrix than just the shapes labeled "information." Cyberspace is a tremendously elaborate tool, but an even more elaborate spectacle.

But the matrix's transformations of data are not arbitrary. Representations of data in the matrix adhere to a specific minimalist style based on metonymical logic. Where in

the Metaverse readers know that the appearance of everything has been produced by programmers who desire a specific look, the Matrix owes its visuals to its "roots in primitive arcade games"(51). But the resulting images are not just neutral yet beautiful expressions of data delivered to users by unbiased computer algorithms. Instead, the matrix presents encodings of specific assumptions about the importance and purpose of the data it contains. In short, the data are *stylized*. Case's tearful return to the matrix makes clear that various data systems have been translated into cyberspace so that specific characteristics of their "meat world" antecedents serve as metonymies for the entire represented institution. For instance, because they are powerful (controlling energy and money), the largest and most visually impressive structures are the Fission Authority pyramid, followed by the bright green cubes filled with banking information. The "military systems," equally powerful and inaccessible to laymen, spin in vast constellations that are both striking and "forever beyond his reach."

The translation of data into visuals is spectacular in its effect but lacks subtlety: energy data is imposing, takes the shape of an imperial structure, and glows like fire; financial data is orderly and colored like money; military data is massive, awe inspiring, but completely inaccessible. Later in the novel, when Case and Flatline travel to the Berne sector of the matrix, the visual simulation again translates data into a predictable set of visual semiotics: "The Eastern Seaboard Fission Authority was gone, replaced by the cool geometric intricacy of Zurich commercial banking […] [they] ascended lattices of light, levels strobing, a blue flicker"(115). There is no computer-related reason why the Fission Authority must be represented as red "plateaus" and Suisse banking looks to be the portrait of cerebral order. As the subject of a metonymic logic, these particular

representations are stylistic decisions made by the matrix, mixing late 20th century American cultural associations with its visualizer to produce the techno-miracle called cyberspace. But just as significant as what is presented is what is not presented. Given the metonymical order of the place, the curcial question that is left implicit is this: what is the net effect of the matrix's omissions? For all its visual riches, the matrix excludes from visual representation much more than it actually includes. The red plateus of the ESFA tell users little to nothing about what the data is or to what purpose it is used—as discussed earlier, all this visualization does is tell users how big and how important the data is, and that it is semiotically related to the color red. But because this representation and others like it are largely metonymical, it becomes clear that exclusion is not a sacrifice made by the matrix for the sake of interpretive clarity or basic navigation; it is an aesthetic that produces a specifically tailored visual world.

Thus, the entirety of the "city at night" look of Gibson's matrix does not, as some critics have suggested, owe its existence solely to *noir* influences or postmodern urbanization. Unlike the *noir* city or even the postmodern cityscape, Gibson's matrix is a clean and vibrant place, glowing with the purity acquired by stripping away all but a few visual signifiers that remain to stand in for the data that controls the world. The net result is more than a collection of spectacular images. Unlike the Metaverse, which enforces spatial rules instead of aesthetic axioms, the matrix's consistent representation by metonymy produces a unified world with an appealing simplicity, buzzing atmosphere, and thrilling pace. It is a virtual world crafted by an aesthetically coherent logic of representation. The matrix is not just spectacular; it is designed, and the aesthetic of metonymy causes the matrix to reduce everything to aspects that are visually interesting.

A given quality is visually interesting (size, in the instance of the ESFA) so it appears in the matrix as the metonymy of the whole, and that quality/object is then made visually interesting because, tautologically, it is in the matrix. Representing by metonymy, therefore, produces a positive feedback loop that drives visuals further into the spotlight of the matrix's purpose. Visuals are both the occasion and the effect of the matrix's construction. The design of Gibson's matrix, both in its representational logic and that its aesthetic coherence, ensures that the purpose of this dataspace is *appearance*.

Yet characters in Gibson's fiction insist that this thrilling representation of data through the matrix is not simply a convenient interface; it is necessary to comprehend the data stored in cyberspace. Gentry, the verbose hacker in *Mona Lisa Overdrive,* names this transformation of data into virtual space "Iconics." Without Iconics, "it was too complicated, trying to find your way to a particular piece of data you needed"(*Mona Lisa Overdrive*, 13). According to this logic, the brilliant landscape of the matrix is not an embellishment, but a necessary visualization. When touring the matrix later in *Mona Lisa Overdrive*, Kumiko recalls what she was taught about cyberspace, a lesson that focused on "humanity's need for this information-space. Icon, waypoints, artificial realities[…]"(220). Even in its first conceptions in "Burning Chrome," the breathtaking visuals that make up Chrome's castle and neon towers are explained as part of a visualizer that "facilitates the handling and exchange of massive amounts of data"("Burning Chrome," 181). And in subsequent descriptions in *Neuromancer*, the matrix is said to possess "unthinkable complexity" without the proper abstraction software (*Neuromancer*, 51) Overall, there is a sense throughout Gibson's writing on cyberspace that without the representational power of the matrix to transform data into

data-space, the data would mean nothing by virtue of its immense scale and quantity. However, these claims are hardly credible given that this "consensual hallucination" really functions more as consensual standards of design and entertainment.

Indeed, some form of interface seems necessary given the data in the matrix, but there appears to be little in terms of utility offered up by the fictional interface style. When computer security software appears as "Things […] launching themselves from the ornate sunburst spires, glittering leech shapes made of shifting planes of light," we learn that these programs in some way mean to attach themselves to any intruders (metonymically presented as "leech shapes"), but this spectacular scene does not provide any other information that would be useful. The function of the programs, the code itself, the objects the software addresses, the authors of the code—the most basic metadata about these spectacles, data often found in the most basic plain-text documentation of programs—would help any hacker much more than merely witnessing explosions in a simulated sky. Of course, that is because the primary goal of these visuals is not usefulness. Gibson's descriptions, from its diction to its layers of appositives, paints striking pictures at the expense of actually explaining what is going on. Driven by visuals, the matrix works more like an elaborate form of entertainment than a dataspace that serves "humanity's need" when confronted with large amounts of data.

Cyberspaces, therefore, present a curious paradox. On the one hand, they represent data and computing infrastructures that operate the entire world, from global finance, to energy production, to corporate business, to military forces. On the other, no one ever seems to use the matrix for its ostensibly intended purpose—work. The random Clints and Brandys, the criminals of the Japanese underground, the protagonists

themselves—everyone accesses the matrix to play, not work. Even the so-called "work" performed by hackers like Hiro, Bobby, and Case resembles fantastic adventure more than actual labor, due in large part to the visual style of cyberspace and its consistent emphasis on visual stimulation. This paradox is remarkably productive; not only does it allow cyberspace to masquerade as a mode of technology developed out of necessity, it also constructs cyberspaces as instances of pure style. Gibson's description of cyberspace as a "consensual hallucination" importantly resembles Alan Liu's analysis of early corporate computing in which multiple sets of computing practices needed to be reconciled: "Corporate culture, in consequence, increasingly managed information work through Disney-like effects of pure, shared fantasy: ambience, texture, milieu—in a word, *style*."[121] Seen in this way, cyberspaces *are* style because they draw together disparate pieces of information and communities of users and unite them in a single, visually brilliant environment. Furthermore, following Liu's notion of style back to the Birmingham school (as Liu himself does), cyberspace serves as its own self-imposed subculture because it is its own "counter-system."[122] It is a workspace used always for leisure or entertainment, a consumption-based way to re-purpose the machines of the corporate and military empires of the dystopian future. With no work actually happening in cyberspace, and unified aesthetics of style defining the prominent logic of its structure and terms of its representation, users of cyberspace always already engage this technology against the grain of its ostensible purpose. Cyberspace's paradoxical obsession with visual fun makes permanent rebels of just about everyone who jacks in, whether s/he is a hacker or not. Indeed, hackers are certainly billed as rebels and punks in this genre, but given the semiotics of cyberspace, the fact that hackers are "rebels" is a

foregone conclusion. The cyberspace medium has already made that decision for them long before they decide to hack or flaunt the law.

The explication of cyberspace's style through the Birmingham school, consuming the style of cyberspace reflects the tensions between those in power and their subordinates. Cyberspace may convert labor into leisure, but it still repeats the same geographies of power present in the real world. The military systems described in *Neuromancer* and "Burning Chrome," the *Snow Crash* empires of Uncle Enzo and L. Bob Rife cannot be toppled easily through cyberspace alone. Instead, they remain largely distant, opaque, or illegible. Because of its massive size, cyberspace remains unconquerable by individual users. Hackers remain on the fringe of cyber-society no matter how much money they make or how adroit their computer skills. And thus the literature of cyberspace, focusing on individual characters instead of anonymous institutions (this is, after all, what literature tends to do) always produces stylish characters as a function of cyberspace itself. By deploying the optitopia for user consumption, the subcultural style of its users becomes the *raison d'etre* of cyberspace. And by reproducing the politics of the meat world in digital terms, characters in cyberspace emerge as fiercely stylish and individualistic. Indeed, they cannot help but do so given the backdrop of corporate and military giants invisibly working in the inaccessible sectors of cyberspace. Being an individual user in cyberspace is even more atomizing than being an individual citizen in the meat world. The sprawls of cyberpunk appear to have at least some physical and demographic limits, but there are no such limits in cyberspace.

Of course, the trick of cyberspace is that it does not frame this position as intimidating or unappealing for individual users. The greater the atomization of the user, the bigger the forces stacked against him, the smaller the individual digital presence, then the greater the spectacle, thrill, and sublime awe brought about in cyberspace. Thus, what was true for the previous section's discussion of personal style is also true for cyberspaces: the style that individuates its participants is also the style of individuation. Through the trope of style, cyberpunk transforms cyberspace from a potential threat to the cogency of the individual human subject to an opportunity to take on the glamorous identity and style of subcultural rebellion. The technologically-saturated future of cyberpunk, then, promises to enhance the style capabilities of humans in the quality of their self-expression, in the pleasure wrought through consumption, and in the sybaritic joys of hacking in dominant culture.

III. At Your Fingertips: The Style of Always-Adjustment

Thus far, this chapter has traced the presence and work of a cyberpunk style in the 1980s and early 1990s that promises increased capabilities of expression and entertainment to subjects/consumers through the use of advanced electronics in literary narratives. Indeed, each examination so far has reinforced the idea that cyberpunk relocates largely twentieth-century means of style-expression to the context of future personal electronics and computing. But cyberpunk does more than repurpose existing aesthetics of style. In the interests of positing a "hyperhuman" future, cyberpunk both invokes standing approaches to style and, at the same time, introduces a new kind of style that uses electronics as a means to transform the relationship between style and

technique, appearance and labor. Under this new aesthetic, techno-style is no longer effected by a user's conspicuous and gratuitous adjustments to mechanical technologies; rather, it is the result of digital technologies making constant and invisible adjustments to the user. The end result is a style of "always-adjusting" technologies—an aesthetic that mixes the downplayed style of twentieth-century cool with the advanced interfaces and artificial intelligences of the cyberpunk future.

Before turning to more readings of specific cyberpunk pieces, I want to elaborate the mechanisms of always-adjusting style and its relationship to more traditional aesthetics of techno-style. According to Liu, who places his study of cool in a genalogical relationship to style developments earlier in the twentieth century, "camo-tech" is the implementation of subcultural style to demonstrate one's adjustment to a given technology. In keeping with the counter-system aesthetic of style outlined by the Birmingham school, Liu points out that, for camo-tech, intensive user adjustment of technique to technology for unproductive ends is the crucial articulation of technology and style. So pervasive is this articulation that "All the most influential subcultural styles of the twentieth century, we must say, were variants of techno-style. They were how subculture ritualized the sense that the particular adjustment defining one's identity […] was secondary to a fundamental adjustment between technology and technique."[123]

In short, camo-tech accounts for the inseparability of style and technology in the twentieth century. While Liu proceeds to locate this trend in the subsequent life of cool in the white middle class/corporate world, these exact mechanisms of camo-tech—conspicuous adjustment for unproductive ends—are useful to help us understand the particular style cultivated in cyberpunk through various personal electronics. In certain

cyberpunk electronics, techno-style gets inverted to produce a new kind of expression when so many processes are automated and hidden behind layers of interface and chic hardware.

In what I will call the "style of always-adjustment" the relationship between technique and technology faces a key inversion. In the place of camo-tech's conspicuous and unproductive adjustment of technology to technique, always-adjustment sees technology adjust constantly to user technique. Where camo-tech requires a great deal of technique on the part of the human user, always-adjustment requires very little; the concealed and automated routines of the digital interface handle most of what Liu describes as technique. In these instances, adjusting technologies provide an inordinate effort of accommodation for users: adaptive interfaces powered by artificial intelligences customize themselves dynamically; fantastically powerful computers require little effort to command; sophisticated hardware fits in a shirt pocket. In each instance, numerous adjustments occur both during the moment of interface and prior to it. Crucially, the tailored construction of complex interfaces and hardware are adjustments just as much as the automated processes of a complex computer that responds and adapts to its user's commands or habits. The temporality of adjustments is not as important as the fact that innumerable unseen adjustments are (or have been) made to accommodate some future or present user. With always-adjusting (or adjusted) technologies, human technique is still significant as the focal point of adjustment (it is often quite conspicuous), but it is no longer conspicuous *and* unproductive. The dense collection of adjustments made by the always-adjusting technology transforms technology use from showing off to cooling down. Visible user technique joins with invisible subroutines or machinations, making

the human component of technology use appear simpler and more optimized than the gratuitous effort of camo-tech. In the place of complex adjustments to bring about a simple result, always-adjustment substitutes quick, activating motions like button punches, keystrokes, and switch flips that cause the technology in question to respond in a way that is more complex and labor intensive than the original input. The resulting techno-style invokes the traditions outlined by Liu and the Birmingham School—namely, conspicuous human adjustment to technology—but marries it to a new aesthetic that prizes optimization over under-productivity. Technology use cools off; more gets accomplished with less effort.

Importantly, the primary concern of this techno-style is not vulgar accumulation of power. The significance of delegating effort, capability, calculation, or intelligence to a given technology cannot be explained as simply an act of human empowerment through technology, nor is the ultimate aim of always-adjustment the godlike enhancement of individual users. For the subjects of always-adjustment, the most important goal is enhanced personal acclimation to surrounding technological and social ecologies. Given the context of an expanding global information/consumer society organized by subcultures—where fitting in is just as important as standing out—location is better than omnipotence. The always-adjustment of this style thus operates symmetrically: technologies adjust to their users to help keep their users adjusted to dynamic and demanding circumstances. The tension between simple appearance/interface and complex functionality is the essence of always-adjusted techno-style.

It is my contention that, while demonstrating the operation of more traditional techno-styles, early cyberpunk features this newer aesthetic of always-adjustment by

imagining devices that are remarkably complex yet simple to use, simply designed, connective, and portable. The presence of this particular techno-style in 80s and 90s cyberpunk is significant beyond simply demonstrating the presence and activity of the style itself; it also points to an important feature in American technoculture that persists from the virtual reality 80s and 90s to the post-millennial internet age that does not rely on equating (approximately or otherwise) VR and the World Wide Web. More is happening in cyberpunk than a series of ideological machinations surrounding the imagination of a comprehensive global network of digital information. While the enduring concept of "cyberspace" has received much critical and popular attention, the fantastic personal technologies offered to readers by cyberpunk texts suggests that the ongoing development of compact and capable personal technologies is a staple technique for Americans to narrate and imagine both technological progress and the transformation of personal style in the face of changing technologies.

In *Snow Crash*, where I have previously examined the currency and amplification of more traditional forms of style and self-articulation, the style of always-adjustment constitutes both the appeal and the form of Hiro's sophisticated computer hardware. From its first appearance, the design of Hiro's personal computer is minimal and austere: "The top surface of the computer is smooth except for a fisheye lens, a polished glass dome with a purplish optical coating. Whenever Hiro uses the machine, this lens emerges and clicks into place, its base flush with the surface of the computer"(23). This initial description positions the computer as a machine with more to give than to take, more potential to be activated than potential for activation. Hiro's interface with the computer does not require conspicuous adjustment on his part. In fact, that the device hides its

capabilities until called upon speaks to its overall design as a black box (literally) that contains nearly infinite possibilities to adjust to its user. Its smooth surfaces and austere appearance forestall any complicated adjustments on Hiro's part; there are simply no visible ways to apply unproductive effort. The lens functions automatically, readers get no in-depth explanations of the manual controls, and, as I suggested earlier, access to the device more resembles watching a film than manually controlling in all the complex functionalities offered by this machine. The effect of the managerial work performed by the user is significant, but that managerial work is nearly effortless. There is a clear synergy between the minimalist aesthetics of the hardware design and the style of always-adjustment—the design both enforces and showcases that the interface will be optimized and elegant. It is not surprising, then, that even the imaging component of the computer is both opaque and automatic:

> [I]t [the lens] can generally keep track of where Hiro is and what direction he's looking in. Down inside the computer are three lasers […] In this way, a narrow beam of any color can be shot out of the innards of the computer, up through that fisheye lens, in any direction […] The resulting image hangs in space in front of Hiro's view of Reality (23).

Hidden behind the smooth lens and its dark optical coating, there are enough lasers and motorized mirrors to draw an entire virtual world in front of Hiro, but there is nothing on the exterior of the computer that would give any indication of this capability. Furthermore, the interface is entirely automatic; detectors track Hiro's location, and motorized optical projection hardware adjusts, without need for conscious command, to his position and movements. Interface is as simple as putting on the proper goggles, and

given the physical design of the computer, this simple and intuitively naturalized interface is Hiro's only option.

As *Snow Crash* demonstrates, the style of always-adjustment often employs cybernetic feedback loops to accomplish an even more efficient use of user input. The motorized optical equipment packed into Hiro's computer both optimizes his technique as a user (part of always-adjustment but not cybernetic) and makes constant adjustments to the dynamic changes in his position (part of always-adjustment but definitely cybernetic). Importantly, however, always-adjustment is a style of hyperhuman identity, one that represses the cyborg implications of advanced interfaces so that they can be seen as conveniences, spectacles, or tools. When paired with cybernetic technologies, always adjustment carries on the conflicted humanist spirit the cybernetic dialectic discussed in the previous chapter: fascinated by feeback-driven technologies but unprepared to cede any of humanity's ontological integrity to the idea of a human-computer circuit.[124] Because it is related to an older form of techno-style that flaunts human control of technology and takes as its primary task the orientation of its users without wasting their effort, always-adjustment thrives on this repression.

Hiro's visit to Norman's 24/7 Motorcycle Mall demonstrates the novel's capacity emphasis on the style of always-adjustment without recognizing the cybernetic implications brought on by "smart," reactive interfaces. Hiro surprises the dealership with a lightning shopping spree that includes the purchase of a recently delivered, state-of-the-art Yamaha motorcycle and a number of custom accessories. Though the process of spying on the dealership via his computer, the controls of the bike itself, and the smart clothing Hiro buys all mobilize cybernetic feedback loops, the subsequently geared-up

Hiro who leaves the showroom seems more like an enhanced version of a traditional Hollywood icon than a cybernetic disruption of techno-stylistic elements of user, technique, and technology. Hiro's purchases include "A full black coverall that swaddles everything from toes to neck in breathable, bulletproof fabric, with armorgel pads in all the right places and airbags around the neck"(270-21). The bike is black and cutting edge. His coverall is also black and doubles as a suit of armor. Hiro even finds a way to attach his swords to the back of his clothing. Technological functionality and purely aesthetic style in this scene are indistinguishable; it is difficult to ascertain where the necessity of Hiro's purchases end and where his consumer overkill begins. Being technologically prepared for any situation becomes part of the style he achieves. No crash, gunfight, or car chase would leave him unprepared, and his appearance advertises this fact, evidenced by the salesman's remark, "you look like one bad motherfucker"(271).

Importantly, Hiro is not large or intimidating. He is not all-powerful. Quite simply, he looks like a "bad motherfucker" because he is *coordinated*, both visually and technologically. He wears all black. He delicately balances his will with the adjustments carried out by his gear, which operates constantly to optimize his efforts. Even when Hiro revs the engine of his motorcycle in a demonstration of the power at his command (an expensive and unproductive use of fuel and technology which smacks of camo-tech) the motorcycle "is so efficient it doesn't waste power by making noise"(271). Its impressive, surgically precise operation epitomizes always-adjustment. This give and take of human coordination and technological adaptation and efficiency is the occasion for, not the disruption of, the narrative's repression of cybernetics through always-adjustment. Even though the motorcycle is "smart" and reactive, the purpose of that adjustment and

efficiency is to help reinscribe the style figure of Hiro Protagonist, not erode his edges. The character of Hiro resembles a negative impression; he is a space around which the technologies around him adapt. The motorcycle that is so intelligent that it "calculates its own most efficient shape […] changes its curves accordingly, wraps itself around you like a nymphomaniacal gymnist"(270) doesn't threaten the distinction between Hiro and the bike. Instead, the smart bike makes that distinction possible by defining its direct object (Hiro) through its adaptive work. Hiro's relationship with the motorcyle is dialectical, not cybernetic. Importantly, this is an imagined relationship brought about by the narrative's emphasis of a particular tradition of techno-style, not an objective evaluation of Hiro's real metaphysical relationship to the technology around him, which is certainly cybernetic.

Further developing this hyperhuman coordination is the way in which this particular scene ends. Hiro makes a flagrantly cinematic exit, made possible by the narrative's temporary focalization through the motorcycle salesman so that readers may watch and admire Hiro's display of precision and power:

> 'Say hi to your brand-new niece,' the guy says, and then lets go the clutch. The spokes flex and gather themselves and the bike springs forward out of the lot, seeming to jump off its electric paws. He cuts right across the franchise and pulls out onto the road. About half a second later, the guy with the swords is a dot on the horizon (271).

Transformed for a moment into "the guy with swords," Hiro is afforded an opportunity to be looked at, to have his style absorbed and appreciated by an audience as he speeds away like a classical, (non-cybernetic) film star. At stake in this throwback biker scene,

then, is Hiro's sense of personal techno-style as a function of his retro-human, non-cybernetic existence. Like a sped up, future-age version of Steve McQueen, Hiro is always in control, a function of both the technologies he uses and his imagined user-position in relationship to those technologies.

Portability, simplicity, connectivity—these are the qualities displayed by technologies in *Snow Crash* that enable always-adjusted technology and always-adjusted subjects. And although William Gibson's fiction appears obsessed with more traditional venues of style and techno-style (from frequent descriptions of designer clothes to the previously discussed counter-system of cyberspace), the style of always-adjustment also works within his texts as a way to organize the broader imaginative domain of "advanced digital technology" into devices that are both efficient and fantastically user-friendly. This fiction indexes technological progress by the reduction of human labor required for human-technology interface.

Mona Lisa Overdrive imagines technologies that, like Hiro's computer, mandate an elegant, dynamic interface through minimalist industrial design. The "ghost" handheld device that Kumiko uses at the beginning of the novel houses an impossibly complicated artificial intelligence, yet fits in a casing that is "a smooth dark oblong, one side impressed with the Maas-Neotek logo, the other gently curved to fit the user's palm"(1). Like Hiro's "featureless black wedge"(21), this device has no immediately noticeable means of physical interface (at least, not to a 80s/90s audience), is remarkably portable given its computing power (*especially* for an 80s/90s audience), and boasts an adaptive interface that accommodates and optimizes the efforts of its user. Kumiko simply touches the ghost unit, and the artificial intelligence awakens, complete with a

holographic visualizer that adjusts its resolution to prolong battery life and a subvocal detector for nearly-telepathic interface (3-5). "Colin," the British avatar of the unit's artificial intelligence, speaks politely and aims to serve: "Seatbelt, miss […] I'll look out for you. Heathrow in three minutes. Someone meeting you off the plane?"(4). Colin is chatty and amiable. Though it is remarkably intelligent, that intelligence is aimed at the completion of a relatively short goal stack: look after Kumiko and keep her company. The interface is simple—touch the unit and then think toward it—but because of the complex and accommodating AI inside the ghost housing, these simple actions bring about sophisticated results. Simply grabbing the unit is enough to make it do any manner of useful things, from recording video to providing important information on a given topic (60).

The "featureless gray package" known as the LF (Cherry's misunderstanding of the word "aleph") serves as a more extreme manifestation of the same principles. Appearing merely to be a plain gray box, the aleph is actually a hyper-capacity memory unit that potentially contains "an approximation of the matrix"(259). If the ratio of computing power to size for Kumiko's ghost or Hiro's motorcycle is remarkable, then the aleph is a technological miracle. While it is true that the aleph is heavier and less sleek than the Maas-Neotek ghost unit, it is preposterously small relative to its contents. Also, the interface with the aleph is similarly easy: simply plug in and the aleph and appears to do the rest. *Mona Lisa Overdrive* never discloses exactly what goes into the act of "jacking in" over the requisite "direct sensory link" other than putting a sweatband laced with electrodes ("trodenet") around one's forehead (130). In this novel, meshing consciousness with a reality generator/massive memory unit could not be easier; it

resembles plugging a lamp into a wall. The actual means of interface remains unelaborated, making the aleph the most adaptive and dynamic interface imaginable, because to use it all one has to do is experience the mental states typically associated with everyday experience and consciousness. The world within the aleph is not subject to the same representational aesthetics as the matrix accessed via cyberdeck. Bobby's simulated gray mansion and its surrounding landscape resemble real space enough so that walking around is as simple as calling on already developed gross motor skills within one's own nervous system. Even though the place seems eerily like a "fairytale," interaction with the aleph environment is seamless. Importantly, this effect is not achieved despite the aleph's sophistication, but—like all other specimens of always-adjustment—as a direct result of the device's complexity. The aleph device is literally a world in a box, a portable electronic that is so accommodating to its users that it is experienced rather than used, a lived environment instead of a visual interface.

At this point it must be noted that, although the idea that human consciousness could exist within a gray brick of silicon seems to be a clear example of cybernetic thought, the novel's execution of this concept is ambivalent. That Bobby, 3Jane, and Angie all end up having their personalities transferred into the aleph does indicate a generally posthuman, Cartesian equivalency between minds and digital hardware. However, the novel overshadows the deeper cybernetic implications of this equivalency by introducing a spiritual dimension to cyberspace, reinstating the concept of an irreducible human essence by blurring the generic boundaries between science fiction and fantasy. For instance, though Bobby's flesh perishes at the end of the novel and he subsequently "lives" inside the aleph, its world resembles a kind of spectral afterlife more

than real life, disclosing an oddly spiritual dimension of the device. Inside the aleph, Angie's sensory perceptions are haunted by strange visions of a "young girl" at the periphery of her vision, yet she is not cogent enough to remember to tell Bobby of these anomalies (257). Furthermore, the "France that is not France" glows eerily with "a steel and salmon sunset" and is filled with visions of people from her past (258). As if the previous aspects of aleph world were not remarkable enough, the novel ends with Angie and Bobby meeting the Finn at midnight, who then drives them down a "long straight empty highway" that presumably leads to a new galaxy of data comprised of alien computing (259-260). Thus, life inside the aleph—characterized by uncanny visuals, haunting, amnesia, and a journey across a dark expanse that crosses over into another world—reads more like an amalgam of myths about death than a cybernetic, post-corporeal life. Finn resembles Charon; amnesia evokes the River Lethe; apparitions from the past could just as easily appear in the underworld of the *Aeneid* as the simulated France of *Mona Lisa Overdrive*.

Like Kumiko's handheld AI and the other ghost units present in her father's library, the most prominent feature of the aleph is what it can accomplish relative to its size and appearance. In this case, the plain gray aleph literally and mythically contains death, and it provides end-users of death with an accommodating interface and convenient form-factor. Because of its activation of mythological registers, the aleph is not a purely digital device; it exists somewhere between the mystical and the digital. To call Angie and Bobby's undeath within the aleph purely cybernetic, then, would not account for this duality. This mythical component of the device enhances its overall capability. The aleph does not just store massive amounts of information; it allows

access to and navigation of fundamental human mysteries. Packaging so much into a simple, portable box makes the aleph the culmination of always-adjusted technologies at the expense of realizing the cybernetic implications of transferring consciousness into a machine.

In the context of cyberspaces and the style of always-adjustment, the greater the intelligence or capability of the device, the fewer conventional interface features (buttons, switches, levers, even screens) are necessary. In fact, when confronted with an austere piece of hardware, we come to expect that the less one sees the more complexity one is likely to encounter within. The sterile, "black-box" exterior of computers, ghosts, and alephs, therefore, does not (as discussed earlier) simply enforce the simplicity of the interface on the part of the end-user; it advertises the sophistication and power of the device. In this regard, the style of always-adjustment defines a relationship between user labor and technological interface as well as a visual aesthetic that promises elegance, responsiveness, and simplicity. Per the ideology of gadgets, the resulting devices are paradoxically not coded as cybernetic, even though they are, in fact, cybernetic. Their casings are more than enclosures: they are diversions, with edges and surfaces that promise a separation between user and intelligent interface that can only exist after substantial repression of the interconnectedness of user and technological system. Because their packages are so striking, discrete, and portable; because the promise entails a mobile system that provides permanent user orientation even in the face of incredibly difficult tasks, the idea of an always-adjusted technology is desirable enough to bring about this repression. Using a digital box to manage and contain death is so compelling

that it distracts from the cybernetic implications such a device might have for the nature of life.

IV. Conclusion: The Second Cybernetics

In the cyberpunk of Gibson and Stephenson, the concept of cybernetics operates in a twofold manner. First, cybernetics functions as cybernetics: the presence of feedback circuits between user and technology integrate the former and the latter into one system. Hiro is not Hiro Protagonist without his computer; Bobby lives both in his body and in the aleph; Molly Millions has computers in her eye sockets. Second, however, cybernetics works as a kind of digital chic, a techno-style that accessorizes human identity rather than transforming it. Through consumeristic emphasis on digital technologies, the counter-system of cyberspace, and the style of always-adjustment, this kind of style cybernetics changes the stakes of human/technology interface. While the first capacity of cybernetics ultimately holds the definition of humanity and human systems in the balance, the second, more style-oriented deployment of cybernetics privileges individual self-articulation. This second cybernetics is not just a distraction from issues of more scholarly import; it is a productive solution to a problem that ubiquitous computing poses to contemporary American subculture, style, and consumerism. Namely, how can current trends in lifestyle and entertainment remain part of a recognizable future in the wake of a digital revolution? Creating a style instead of a radical metaphysics, cyberpunk repurposes cybernetics as a way to think about the future in terms of the present. Through this slippage between cybernetic registers, cyberpunk is less concerned with what a person is and more concerned with what a person owns, what

a person looks like, and whether or not s/he is cool. Advanced technology, for Gibson and Stephenson, is both the means and the occasion for amplifying contemporary technoculture so it may survive its long trip into the imagined decades to come, projecting hyper-styled, hyperhumans into an uncertain future.

CHAPTER 4: ELECTRONICS AND COGNITION: GADGETS AS CINEMATIC FORM

Pat Cadigan's *Synnners* is a novel that, in contradistinction to the cyberpunk novels examined in the previous chapter, is not concerned about the experience of cyberspace as a coherent environment. Instead, the novel explores human brains as their own virtual spaces. Generically, *Synners* is cyberpunk, but this novel's imagination of implants that can record dreams and mental visualizations for use in music videos anticipates something that Gibson and Stehpenson's novels do not: the contents of the brain being entertaining because of its homology to digital entertainment media. Imagining that a hacker can neurally interface with a computer is one thing; imagining that those hacker neurons can produce digital media complete with recognizable cinematography and visual conventions is something different altogether. *Synners* discloses an impulse to visualize the brain according to the stylistic conventions of digital entertainment. In this instance, science fiction solves fundamental neurological mysteries in the same way we entertaining ourselves; sitting back and watching.

In previous chapters, I have discussed how gadgets have been influential in how Americans visualize humans and technologies of the future, and their primary significance throughout this study has been their power, through entertainment, to delineate where non-human information ends and where the irreducible humanness of users begins. And while much of this study has studied literature as the substance of gadgets, popular cinema has been uniquely instrumental for validating gadgets as an epistemology of technology, personhood, and information. It is also the place where the implications of Cadigan's novel are played out to their fullest extent. As has been the

case throughout this project, gadgets visualize information in ways that reduce complex informatics to cinematic spectacle.

Cinema proper is no exception to this tendency, and in the wake of the cognitive revolution of the 1950s and 1960s, when brain began to be seen in computational terms, visual media representing mental processes are a crucial site for examining the influence of gadgets on the popular imaginary of humans and technology. While it is true that examples of brain activity interacting with computer code abound in U.S. popular cinema and visual media (*The Matrix Trilogy, Minority Report,* and *Avatar* being some of the most recent and lucrative examples), these films often deploy gadgets as a means to resist truly posthuman translations of human minds into digital information. We may see computers and brains swapping information, but presentations of mind/computer interface deploy conventions established by contemporaneous consumer electronics in order to manage cybernetic possibilities for human/technology interaction. Instead of serving up brain-as-computer scenarios that indicate a broader posthuman relationship between humans and information, these cinematic representations are actually brain-as-gadget configurations that enforce the existence of user subjects. Through gadgets, the films visualize biological brains as digital devices, but these devices ultimately receive instructions from an immaterial, overseeing human mind that cannot be reduced to computational hardware. This use of gadgets instead of computers avoids any broader cybernetic implications potentially might upset formulaic endings that see liberal human subjects restored from the wounds of cybernetics. Like the work of Gibson and Stephenson, these films use gadgets as the organizing principle through which they negotiate the potentially conflicting terms of technological proliferation and human

autonomy. But crucially, gadgets aren't just a discursive metaphor; they also work as a visual logic of cinematography and editing that encodes the user subject position and the activity of management within the formal construction of films.

Cued by the issues raised in Cadigan's novel, this chapter examines two screen adaptations of Philip K. Dick short stories, *Paycheck* and *Minority Report*. Rather than survey all films that treat cognition and computing, I have selected these two adaptations in order to show the impact of gadgets as a non-discursive strategy for conducting mind/computer interface such that the former can never be fully reduced to the terms of the latter. Neither short story focuses on the parallels between minds and computers, yet both screen versions devote a significant amount of time and special effects to showcasing computer equipment that can translate memories, visions, and other experienced mental states into digital images. But these scintillating visuals do not ultimately equate minds and computers; they discipline the traffic between them so that the core of what it means to be human remains outside the purview of the digital.

Released in 2002 (*Minority Report*) and 2003 (*Paycheck*), both films derive from short fiction that includes little in the way of visual description. Dick's style in both stories is to focalize action rather than appearance, and while he may discuss the basic idea principles and features of the technologies he imagines, those technologies never involve screens or video. For Dick, a punchcard or a mirror is the visual interface for his time-telling machines, not elaborate arrays of screens. The visualizing technologies in these films, then, are not just the byproduct of adapting print to screen; they are the culmination of a popular obsession with consumer-managed digital media.

I. On Minds and Metaphors of Machines

In linking these films to debates within the cognitive sciences, I argue that even though brains and computers have been and continue to be compared to one another in both fiction and science, the terms of comparison vary dramatically. The basic metaphysics and ideological implications of any comparison need to be examined critically; because the brain and computer have and continue to constitute one another metaphorically, the brain as computer metaphor is always unstable. Only after recognizing this instability can any comparison between brains and computers be employed effectively (and responsibly) in theories about contemporary technoculture and narrative media.

In order to appreciate the specific activity and terms of *Paycheck* and *Minority Report's* representation of memory and cognition, it is crucial to understand the contours of the mind/computer discussion within recent scholarship of the cognitive sciences, although there is no absolute consensus as to how human memory works. As Jose van Dijck points out when she describes a variety of recent work in cognitive science and human psychology, memory is a process distributed across many portions of the brain. Memories themselves are not static, archived files housed in any one part of the brain; although the hippocampus and amygdale both play crucial roles in memory assemblage and recall, but the entire process of creating, storing, recalling, and weighting memories happens throughout many more parts of the brain than these two.[125] Zapping single brain cells as if they were file folders filled with video clips or calling up visions in desktop windows comically simplifies the brain as described in contemporary neuroscience. Following suggestions from Henri Bergson and more recent cognitive scientists, van

Dijck posits that memories are *performed* every time they are recalled, not just repeated. This performance changes their substance and significance with each recollection.[126] In this regard, memories are not high-resolution snapshots or video—they are far more dynamic forms of information storage, retrieval, and reassemblage. In light of van Dijck's elucidation, it is impossible to digitally extract a narrative video feed from individual brain cells. As there is no direct cell-to-content correspondence for memory storage and recollection, no one should be looking to *Paycheck* for any accurate reflection on scientific thought about the substance and mechanics of human memory.

That said, however, *Paycheck* and *Minority Report* share with a larger body of the cognitive sciences a close metaphoric association of brains with computers. But, unlike the cognitive sciences and posthuman theory, the films envision a way to interface and even equate brains and computers without recourse to the models of the cyborg, artificial intelligence, or the posthuman. After all, just because brains and computers are portrayed as interfacing with one another does not mean that these interactions represent a cyborg consciousness or a posthuman ideology. Just as the concepts of the mind and brain have been variously reincarnated through different metaphors and philosophical traditions, the concept of the computer comes in a variety of architectures and semiotic registers, and as metaphors and even simulations of cognition, computers vary historically as to what specifically they signify about the ontology, structure, and function of the brain. This slippage becomes particularly evident when we examine the deployment of the computational metaphor in the initial foundation of the cognitive sciences and the subsequent transformations that have occurred within the field. While *Paycheck* undoubtedly gestures towards the contemporary cognitive sciences in depicting the

parallels between brains and computers, scholars of cognition are divided about what aspects of a computer are the most useful to deploy when modeling the brain. In this respect, the film inherits and discloses a wide-reaching and fundamental anxiety about how exactly brains and computers are related, if at all. Whether a brain and a computer are connected to each other in American fiction or in the cognitive sciences, there is still much to be determined about what properties a given computer projects onto its fleshly counterpart by means of theoretical comparison and modeling. This ambiguity exists in the cognitive sciences because the metaphor of the computer is productively unstable, because researchers have emphasized variously different aspects of computers in order to maintain them as relevant constitutive metaphors and models in a field of research that continues to evolve, both in scientific and popular circles.

Throughout the cognitive sciences, a key ambivalence structures the various deployments of computers in the labs and rhetoric of researchers: is the computer a merely a suggestive metaphor for the study of human cognition, or is it a platform upon which cognition may be emulated or even reproduced? Is the computer, in other words, a metaphor or a model? In their formative years, the cognitive sciences relied often unselfconsciously on the computer as both. In the face of behaviorism's intense focus on external rather than internal states in the 1940s and 1950s, the computer provided a means to design models that were suggestive of internal mental processes. Drawing on the suggestions offered by the hypothetical Turing Machine, mathematicians saw powerful automated computers as a way to test rigorously earlier nineteenth century speculations that thinking was a form of computation.[127] Once it was established that information could be represented as a series of choices between binaries, it was not long

before researchers began designing machines that carried out appreciable emulations of human thought processes in electrical circuitry, the most notable early example being the work of Claude Shannon.[128] Shannon's work in particular, Denise Delarosa Cummins points out in her concise history of the cognitive sciences, drove home the idea that thinking could be automated. Crucially, the work of Shannon and others also led to the foundation of a key assumption, implied but not necessarily dictated by the former insights on automated thinking: that the binary firing of neurons made the brain not simply analogous to computers, but a kind of digital computer in its own right.[129] Thinking, perception, and reflex all could be studied as forms of computation done by a dynamic and active system. This line of thought overthrew the behaviorialist model of the brain as a passive receptor of external conditioning. It also marked significant progress towards approaching internal mental states from a rigorous scientific perspective.

Despite the incontrovertible influence computational theories of thought have exerted on the cognitive sciences over the past 60 years, the status of the computer as an analogue, suggestive metaphor, or full-blown modeling platform for the brain remains contested in the now diverse field. Indeed, other scholars since the 1950s including Ulric Neisser, Max Wertheimer, and John Searle have questioned exactly how a productive a research tool the computer is when dealing with issues of human cognition, and whether or not brain/computer comparisons are worth keeping around.[130]

But the significance of computers in the cognitive sciences is more nuanced than simply defining a specific symbolic relationship between the computer and the brain. Even among those who see the computer as an analogue or a metaphor for brain activity

and not a potential replica, real differences exist in how the figure of the computer is mobilized as a technology of comparison. That is, there is no consensus as to what *kind* of computer the brain resembles, and even how strong the comparison between the two should be. Early cognitive psychologists used the computer as an analogue for the brain, but the computers they were dealing with differed significantly from later models. Conceptions of computers as logic machines in the 50s and 60s yielded theories of cognition that saw thinking and even perception as computational processes that are driven by symbol manipulation, propositions, syntax, and division into subsystems. [131] This is known widely as a "top-down" approach: researchers first identify a specific mental function and then subsequently design a computational architecture to carry out that functionality.[132] For example, if we see humans playing chess, then computationalism states that we can learn about the cognition of those humans by building a computer that also plays chess. As a general theory of cognition that draws on computers for insight, then, computationalism relies on a very specific understanding of a computer as a logic driven, symbol manipulation system.

Yet later connectionists, who also draw on the parallels between computers and brains to establish the suggestive weight of their experiments, offer quite different theories. Instead of building an architecture around a specific functionality (top down), connectionists build the architecture first, then devise ways to perform a target function with that basic structure. Their understanding of what makes a computer similar to a brain is not necessarily "computational" at all.[133] Connectionist computers are actually networks of simple units with dynamic connections among them. Rather than programming the computer with a specific set of commands, the connectionist network is

trained; a battery of repeated input signals travel through and stimulate the network to modify the weight or intensity of the connections among the various units. Once a given activation pattern can be consistently reached, the network is considered trained. Information storage therefore does not work in these connectionist architectures as it does in classic computationalist models. There is no program, syntax, or symbolic manipulation involved. There is no database either. Instead, information and parameters for the system's operation rest primarily in the connection weights between the units of the network.[134] These architectures indeed carry out computation, but the structure of that computation and its relationship to input/output differ radically from the Turing archetype of the computationalists. It is, to put it another way, a more cybernetic model of computing, more concerned with feedback loops and dynamic relationships among information. Yet connectionist networks thus far offer more suggestive than comprehensive answers; the same simplicity that allows for their construction and experimentation in the lab also means that they do not approach the density and sophistication of a biological neural network. Nevertheless, they have been extremely influential in contemporary thinking about the neural architecture of the human brain.[135] It is important to recognize, however, that the connectionist computer metaphor has not superseded the computationalist computer metaphor and put it to rest for good. The debate still stands between what kind of computer most closely resembles the process of human cognition.[136]

Varying metaphors even coexist within the formulation of a single model. In describing his approach in *Modularity of Mind*, Jerry Fodor points out a key weakness of cognitivist approaches: their understanding of perception as a computational process

leads them to assume that all computational functions are integrated and operate from a common database.[137] Perception, says Fodor of the erring cognitivists, is thought to have a high degree of penetration into cognition, knowledge from previous experiences, and other higher order functions. Their model of the brain is computer-like, but each computing operation is effectively integrated with others, and all share a common database. The assumption that brains actively compute all stimuli, even reflexes, leads to a subsequent assumption that brains *similarly* compute different kinds of stimuli and mental processes.[138] This idea of a single computer running multiple integrated operations allows Fodor to introduce his concept of a modular mind; he does not revoke the old computer metaphor wholesale; he merely alloys it with some new metaphors of his own:

> A module is (inter alia) an informationally encapsulated computational system-an inference making mechanism whose access to background information is contrained by general features of cognitive architecture, hence relatively rigidly and relatively permanently constrained. One can conceptualize a module as a special-purpose computer with a proprietary database, under the conditions that: (a) the operations that it performs have access only to the information in its database […]; and (b) at least some information that is available to at least some cognitive process is not available to the module. It is a main thesis of *Modularity*.[139]

In the place of a computer running several integrated processes that are not informationally discrete, Fodor substitutes a series of specialized computers, each with its own "proprietary database." The core computationalist assumptions about what brain

activity is remains untouched—the brain still computes according to inference, syntax, and previously stored data—but the fundamental cognitive architecture of the brain shifts. An established metaphor facilitates the imagination of a new one, and the multiple computers/discrete databases model succeeds in both elaborating a new understanding of the brain without rejecting the core set of assumptions that motivated cognitive science in the first place: computers and brains are analogous structures. Fodor's is not a unique maneuver (indeed tweaking the computer metaphor to explain a featured concept in cognitive science happens all the time[140]), but it demonstrates well the variation that occurs when metaphorizing cognition and computers, even within a community of like-minded researchers.

It is by no means my intention here to adjudicate or even comprehensively outline the diverse and complex problems faced by cognitive science. But I have argued that even in the most scientific attempts to explain and model brain activity, the metaphor of the computer is not stable, and is certainly open to revision, radical redefinition, or departure. Explicating the specific ideologies disclosed by *Paycheck* and *Minority Report's* fantastic computer-brain interfaces thus requires specific attention to the terms and structure of the metaphor that constitutes its visual logic of memory. That a brain is compared to a computer only tells us so much. It at this juncture that our continued attention to trope of digital video throughout the film begins to yield some specific answers and suggests a theoretical apparatus with which to examine popular technoculture that does not rely on cybernetics as the ur-structure for the human-computer imaginary.

Because storing and manipulating video files so closely resembles the ways in which *Paycheck* and *Minority Report* figure memory, consciousness, and perception, it is clear that consumer media, not posthuman technologies, function as the constitutive metaphor for this film's technological imaginary. The *kind* of computer the brain resembles appears to be more like a digital media player than a neural network or a cpu-architecture predicated on databases and command sequences. Instead of a Turing machine or a connectionist architecture, both films present us with Windows XP Media Center.[141] This recourse to digital video as a metaphor to imagine mind/brain interface suggests that consumer technologies are operating not just as commodities in the contemporary economy, but also as a structuring trope for subject/technology relationships in the broader domain of contemporary American (techno)culture.

II. Paycheck and The Show Business of Mental Content

In the science fiction world of *Paycheck* (John Woo, 2003), computer hardware detects and visualizes memories. One of the film's most memorable sequences shows Michael Jennings (Ben Affleck) resting unconscious on an austere reclining chair, centered in what looks to be an operating theater crammed with computer hardware and numerous screens. His top-secret dealings with electronics firms require that his memory be cleaned of any sensitive information, but first that information—his memories of specific experiences and procedures—must be located and presented onscreen. Memory erasure technicians and corporate executives, both of whom want to see the confidential information vanish, crowd around the equipment to get a better view of the multiple screens that dot the room. A ring of sensors wraps the crown of his head with a halo of

LEDs, and a schematic of his brain appears on an Apple flat panel display to the left of the chair. Onscreen, his cerebral tissue is rendered neuron-by-neuron in an iridescent green schematic. When the memory wipe begins, another Apple display, sitting opposite the first, images the stored content of each nerve cell, projecting video clips of Jennings' memories that correspond to the neurons the technical staff isolates by feverishly tapping on a QWERTY keyboard. When selected, the nerve cells obediently playback their content and allow for a moment by moment navigation of Jennings' experiences. Then, with a single tap of the DELETE key, the offending neurons are zapped out of existence on one screen, and, on the other display, the corresponding memory content of those cells flickers and fades to noise.[142]

As a science fiction thriller that revolves around retrieving and deleting information from human brains, *Paycheck* stages and ratifies Cartesian assumptions about the mind.[143] Built around the processes of memory erasure and recovery, the film is a peculiar fantasy about human cognitive activity and the ontology of memory. Namely, the film imagines conscious memory as a collection of data that can be transferred, deleted, and recorded by computers. But although *Paycheck* mixes Cartesian thought with its fictional computer-brain interfaces, it is not a simple posthuman tale of digitizing human minds. Marked by specific decisions in camerawork, product placement, and editing, memories in *Paycheck* aren't simply digital code; they are digital video—fetishized content trafficked by personal electronic devices. The formal aspects of the film that render Jennings' memories as discrete video clips, not personal experiences, imply a user/technology relationship found more in the consumption and use of consumer electronics than in contemporary cybernetic theory.[144] Far from rendering him a cyborg,

Jennings' brain is analogous to a TiVo unit, where his neurons store and playback video while a transcendent Cartesian ego struggles to maintain possession of the remote.

Because *Paycheck* foregrounds the attendant problems of representing cognition and memory in visual media, it offers the opportunity to analyze the recurrence of video as a coherent trope through which so many representations of memory, cognition, and personal identity are constructed in fiction and popular culture. As *Paycheck* demonstrates, comparing the brain to a *consumer-grade* computer (as opposed to a more sophisticated architecture) actually undercuts the cyborg metaphysic, not reproduces it. By marking memory as digital video and not just digital code, *Paycheck* discloses a serious ambivalence about human/technology relations; any digitization of human beings must ultimately be structured according to a metaphysical framework that reconstitutes and enhances specifically liberal-consumerist constructions of the human subject. Rather than articulating posthuman ideologies that collapse the ontological separation between humans and digital technology, *Paycheck* ultimately participates in a broader gadget logic that naively reaffirms human sovereignty over both technology and embodiment itself, an ideology we might term hyper-human, not post-human.

From its opening minutes, *Paycheck* elides the differences between memory and digital video technologies. During the remarkable scene where we first see him incapacitated and surrounded by screens and suited figures, Michael Jennings goes through one of the many "memory wipes" that have defined his career as an engineer working on top-secret projects for wealthy electronics firms. At the completion of every job, Jennings' assistant Shorty (Paul Giamatti) conducts a sweep of his brain to eliminate any incriminating memories, thus releasing Jennings for further employment with other

companies. But the representation of what Jennings' memory looks like, where its stored, and how it can be eliminated speaks volumes about the film's tacit assumptions about the human brain and human memory. Each of the two Apple LCD cinema displays that bookend Jennings' cranium has a specific job; one shows the specific location of the memory, another shows the content of the brain cell in question. Rendered in this way, Jennings' brain resembles a three dimensional interface for a desktop computer's file folder system, with each folder containing a digital video clip. With this single medium shot of Jennings and the two displays, the film fills in the mysterious and age-old disconnect between the neuro-chemical level of brain activity and experienced mental states, termed "Leibnitz' gap" by cognitive scientists Denise and Robert Cummins.[145] The prevailing question about cognition for centuries has been, how the neural architecture of the human brain produces the "mind." If memories are video clips, *Paycheck* suggests then that problem has been solved. The connection between architecture and perceived image exists implicitly. The film offers no explanation about how memory works, or how the memory wipe can be pulled off, or, more broadly, how the brain and mind are related. This equivalency of mind and video image produces a slick tautology: video represents memories *and simultaneously implies the apparatus within which the memories operate*. Video becomes not just a theory of memory, but also a (consumerist) theory of mind, transforming the brain into a digital technology.

The status of memory as video is made even more obvious by the cinematography of the memories themselves. The display on the left initially shows an extreme long shot of Jennings entering the clean room for the first time, but this entrance is shot from an objective, third-person perspective. It appears then, that the cinematographers of the film

(Jeffrey Kimball, Gregory Lundsgaard) are also the cinematographers of Jennings' mind. In fact, all of Jennings' memories are presented with mobile framing, high angles, extreme close ups, or long shots that in no way resemble a first-person perspective. They are only recycled clips from the film itself and give no indication that they actually reveal Jennings' own point of view. Because these images are *of* Jennings and not perceived *by* Jennings, they invoke the visual style of late twentieth and early twentieth-first century Hollywood cinema, reinforcing the counter-intuitive assumption that the content of a brain is footage, not personal memory. Yet no matter how absurd this visual calculus may seem when its implications are teased out, the sleight of hand still works; instead of wondering what's wrong with their device when they see a high angle shot of Jennings' passionately kissing the company lawyer (which has been obtained from Jennings' memories!), the corporate execs are instead concerned with their coworker's promiscuity, exclaiming "Jesus Rita!"

In keeping with the film's prevailing video logic, all the characters who are present assume that the images streaming from Jennings' head represent actual occurrences rather than an active imagination. Why nobody interprets the clip of the Jennings-Rita affair as a fantasy as opposed to a memory of an actual event speaks volumes about the empirical truth-value attached to "extracted memories." Such an attitude positions the human brain as a kind video camera that *objectively* records the world around it (in high definition, even), mimicking a faith in the camera/recording apparatus similar to Andre Bazin or even cinema verité documentarians. The problem with memories proposed by this film is not that they are misleading or personally inflected (as seen, for instance, in the haunted version of personal memory presented by a

film such as Chris Marker's 1962 *La Jetée*), but that crises arise only when memories cannot be fully accessed. Thus, because Jennings' deleted memories are coded in terms of both cinematographic conventions and the file organization system of digital computers, digital video emerges as the film's primary metaphor for understanding the nature and function of mental function. In its rendition of minds, brains, and screens, *Paycheck* ratifies a broader popular tendency to depict memory as a filmic, primarily visual phenomenon.

Not surprisingly, then, digital video structures memory recovery as well as erasure. When federal agents attempt an "extraction" of Jennings' previously deleted memories, their efforts only rehearse the logic established at the beginning of the film. The equipment and graphical user interface of the memory manipulation procedure remain similar, complete with multiple monitors, colorful brain imaging, and keyboard and mouse. But now, the computer equipment does not yield satisfactory results. A close-up shot of Jennings' sweating and unconscious face cuts to a montage of garbled images, suggesting that the audience is now privy to his broken and incomplete memories. This montage terminates in static, and the shot tracks out to reveal the frame of an LCD display that frames the sepia-toned noise. Even though the procedure has failed, the editing and cinematography again reinforce the idea of unproblematic representation of mental activity as video; the camera skates in and out of Jennings' thoughts to conflate what Jennings' visualizes and what is visualized on the digital screens.

This core set of filmic assumptions also dictates other properties of memories. The way in which *Paycheck* registers the degradation of memory also takes video and

consumer technologies as an antecedent. In the wake of Jennings' latest memory erasure, the federal agents can only watch helplessly as their equipment extracts a series of images that are too damaged to comprehend fully. Pieces are missing from some shots as if they have been partially burned away by a bright white light, and in many others they are distorted by sectors of enlarged and overlapping pixels that make for a disturbing cubist effect. Once the few images available have run their course, viewers are left with only a swirling pattern of faintly defined objects, barely discernable through their linear distortion and faded colors. Meanwhile, a high-pitched sound that resembles an analog TV tuner struggling to find a signal starts up as soon as the chaotic and damaged images fade to noise. In a strange amalgamation of media semiotics, this rendition of incomplete or damaged memories alternates its frames of reference between digital and analog technologies. Pixilated and punctuated by hissing static, Jennings' memories are at once likened to damaged video files and a mysterious electromagnetic signal that cannot be fully received. Despite this scene's mixing of metaphors, the film's core assumption about memories remains the same; they are a special kind of visual content that can be trafficked between pieces of hardware that closely resemble, in form and function, new generations of contemporary consumer electronics. Although reducing memory to digital video accomplishes this articulation, likening memory to a television or radio station in this scene also produces a similar conflation of consumer technologies and the human mind/brain. Significantly, as they are presented with incomplete video clips, the agents have no recourse beyond their visualization equipment. If they cannot see anything on the screen as spectators, their investigation stops. Like end-users of consumer technologies, they cannot "hack" the firmware or the code of the brain. They only know what they see.

The agents can only articulate their frustration as non-specialist users of otherwise miraculous equipment: "Shit…Nothin!"

Ironically, *Paycheck*'s visualization of the future resembles its visualization of personal memory; computers archive personal experiences as if they were video clips, even if those experiences haven't happened yet. For at the heart of the mystery surrounding Jennings' erased memories is a giant supercomputing machine that can see future events before they happen. As the former engineer for the project, Jennings is able to foresee the destruction of the world by using the machine, saving the images he saw onto both the machine's hard drive and microfilm, and, knowing what will happen, leave himself an envelope of everyday, seemingly innocuous items that, even after his memory is wiped, can lead him back to the machine to destroy it. The envelope of common items evades the notice of the ever-watchful corporation that employs him because the objects become powerful only in the specific contexts and improvised applications that Jennings foresaw. Once he figures out what the machine is and where the envelope of items has come from, Jennings and his girlfriend Rachel (Uma Thurman) return to their experimental research campus to destroy the future machine and save the world from its corrupting foresight.

The items in the envelope and their use in specific situations propel the film's narrative forward as Jennings slowly uncovers his past and discovers the purpose of his secret work. Cigarettes help him evade the police by setting off a well-timed fire alarm; a book of matches leads him to a lunch-date reunion with Rachel; a seemingly random keycard allows Jennings to access the top-secret research campus; a silver dollar is the perfect size and conductivity to short out the magnetic security lock to the campus'

sanctum sanctorum, buying Jennings and Rachel a few extra minutes to work on the future machine once they are inside. But before he deactivates the machine for good, Jennings steps into the throne-like interface of the machine in order to "put this thing to good use one last time to get us out of here." Once his palms and fingertips rest on the glassy controls, the machine boots up with a digital flourish. Four smaller displays flicker to life and begin to display lines of unintelligible text, and the sound of an accelerating turbine dominates the scene as the gigantic main display swirls with blue lightning. Jennings' photo, user profile, and file archives then appear on one of the smaller displays as he begins scanning the database. The main display responds by projecting a pattern of swirling blue lines that suggest rapid forward motion through a narrow tunnel, and a rapidly cut series of video clips begins, with each cut punctuated by a sound resembling two hot wires making contact. Through this fractured montage, viewers see a number of future events, many of which have already come true in the film. The future machine recalls Jennings' preparation of the envelope, his interrogation at the hands of the FBI, and his decision to leave the lab, all from its database of recorded visions. These once future events are now history. But the machine presents each "predicted" event as excerpts from the film itself; the same shots that have narrated the film up to this point are now reproduced on screen as events that were foretold. Some shots are objective and from high angles, others are close-ups that seem to be from Jennings' point of view. Both formally and logically, the moving images presented by the future machine do not fit together. They are neither impressions of events to come nor replicas of a given subject's perspective. Instead, they demonstrate the varying perspectives available only in the cinema, in which subjective extreme close-ups cut to

high-angle long shots without interrupting the conventions of viewing established by thousands of preceding films.

In order to exist as representations of a real narrative of events and not a random series of pictures, these images rely on the constitutive metaphor of digital video, even if the crystal keys and swirling lightning displayed by the interface approach a mystical register. In Dick's short story ("Paycheck," 1952) the future machine is a special kind of steam shovel that literally opens a door to the future through which one may look and interact. Drawing on metaphors of 1950's postwar industrialization, the future machine/skill crane is the creation of a top-secret construction company. Likewise, drawing on the technological vernacular of it's time, the film's version of this technology is a virtual one, however, allowing Jennings to view and even print out images from the future without physically accessing it. In their storage, retrieval, formal presentation, and intimate association with computer hardware (as opposed to construction equipment in Dick's version), *Paycheck's* images of the future resemble the multimedia content of cellular telephones, personal media players, digital cameras, and personal computers more closely than that of any other visual technology, supernatural or otherwise.

The Jennings death sequence serves as the cornerstone for this video logic of the future. Played back on the future machine at the climax of the film as well as in Jennings' memories of what he saw previously on the machine, this sequence repeats throughout the film. It begins with a high angle shot of Jennings entering a room, followed by an extreme close-up of a bullet being loaded into the chamber of a semiautomatic pistol. The sound of the firearm action clunks loudly, and an extreme close-up reveals a finger depressing the trigger. Then, after a white flash, the bullet fires

out of the chamber in slow motion, accompanied by the slowed sounds of rushing air. The sequence cuts to another extreme close-up of the bullet, this time from a straight-on angle that tracks backwards, retreating as the bullet moves forward. When the bullet gets close enough to fill the entire frame, the sequence cuts to a following shot as it heads towards Jennings' chest. The sequence ends when the slow-motion frame rate speeds up, and the bullet accelerates and finds its mark. Jennings collapses and presumably dies.

What is noteworthy is not just that this scene's extreme close-ups, faced-paced cuts, and reliance on computer hardware to code its visuals as digital video, but that the CGI (compuer-generated imagery) bullet in high-resolution and the ramping used to slow down and speed up the bullet in a single shot are techniques *found only in digital post-production of films*. The most important special effects in this scene are not the flashy lightning bolts or glowing glass spheres that constitute the machine's interface, but the techniques of digital cinematography that mediate the film's visualization of future events. Structured in this manner, Jennings' future apparently has a director, cinematographer, and a host of digital postproduction specialists. This visualization of the future also fits in a digital database and plays on screen in high-resolution, and a single end-user standing on the interface podium can access all of it handily. Through its presentation of both past and future, *Paycheck* reduces human experience to multimedia content, falling back on the familiar calculus of digital video to structure the haunted and uncertain territories of memory and futurity. The resulting visuals transform all events into a collection of video clips that a properly equipped user may browse, delete, or even edit.

The same is not true of all flashbacks and flashforwards in film. Although films from *Citizen Kane* to *Pulp Fiction* unfold past events by using the cinematographic conventions established by films themselves, *Paycheck* adds another wrinkle to this representational tautology. It features individual users accessing past and even future events through pieces of hardware. While in the more traditional construction of flashforward and flashback the viewers of the privileged footage remain *spectators* of future or past events and at times of characters' memories, the past and future footage in *Paycheck* is accessed by the activity of specific hardware *users*. The concealed eye of the camera does not show viewers the past or future in *Paycheck* as seamlessly as it does in *Casablanca*; Jennings and other hardware users must access these domains on behalf of the audience by using state of the art (as of 2004) visualization technologies. Characters' experiences are not simply represented in a traditional cinematic vernacular; they become occasions for the performance of digital video and computer hardware. The film's engagement with multiple temporalities, then, is not just a matter of seeing the past, present or future, but also a question of who gets to see, the manner in which they see, and by what means they see. In this film, it is the digital video apparatus and its sovereign user who serve as mutually necessary components of any visualization of the past or future. *Paycheck's* economy of digital video, both past and future, works as a kind of memory in its own right, a means through which subjects may navigate multiple temporalities without actually being present within them. Where video used to be a technology of archiving only the past, *Paycheck's* speculative "science" envisions a radical extension of its archiving powers into future events. All components of

experience transform into part of a larger digital archive of time and space—all components except, as we shall see soon, for the liberal human subject.

At the ending of *Paycheck,* Jennings, his girlfriend Rachel, and his assistant Shorty manage to escape the hi-tech world of covert research. The final scene of the film showcases their new nursery, replete with orchids that, despite differences in species among the plants, are all in bloom at the same time. Color and vitality are everywhere as Rachel mists the plants, and, at the same time, Jennings does his part by hefting large sacks of soil over each shoulder. After a few moments, Shorty arrives with a shipment of supplies for the nursery, including a cage containing Rachel and Jennings' love birds that have been salvaged from her old lab. With the entire family of friends and animals united, smiles and good humor pervade this formulaic Hollywood ending. Even though Jennings has lost all memory of his previous three-year relationship with Rachel, they are still deeply in love. And even though Rachel asserts earlier in the film that "we are nothing but the sum total of our experiences," she treats Jennings as the same man she fell in love with years ago despite his artificially deleted memories and experiences. As *Paycheck* winds down in this fashion, the ideological resolution of the film becomes clear: despite their close association with science and technology throughout most of the film, Jennings and company are able to leave behind the world of computers and engineering and restore themselves through a simplified ideal of "nature" that exists apart from the human built environment. In the wake of digital and chemical mind surgery, Jennings is still Jennings, blissfully working an honest job in his new organic habitat. Although this sudden shift in location from laboratory to conservatory may seem abrupt, this naïve affirmation of humanity over technology is consistent with the rest of the film.

As an engineer, Jennings skates through technical problems with rare genius; he even rigs up makeshift contraptions using seemingly useless objects in a style reminiscent of Angus MacGyver. As a subject of memory erasure, Jennings somehow retains his Cartesian *ego* in the face of a digital mind-brain interface that could potentially threaten the ontology and solvency of his selfhood. His psychological core and personal identity are insulated by *Paycheck's* rendition of human memory as a mental module, entirely discrete from the rest of the mind, that performs the function and architecture of digital gadgets. The issue is not whether Jennings is human or computer, but whether or not the human Jennings will ever regain control of his mental hardware. The brain becomes the digital hardware at the disposal of a non-digitizable, altogether human, mind.

The final seconds of the film reveal that Jennings has used the archives collected by the future machine to win millions in the state lottery, showcasing once again that he is a master of both technology and his own fate. That this film features seemingly posthuman digital technologies being repurposed toward the formation of a coherent human subject within a computational world is profound, suggesting that posthumanism cannot suppress the hyper-human impulses found in popular entertainment.

III. *Minority Report*'s Digital Psychics

This brute equation of experienced mental states to digital video closely resembles *Paycheck* and one can see *Minority Report's* influence on the former. But the films are not identical, and while *Paycheck* visualized memories and prophecies as part of the same stream of video information in order to dramatize Jennings's struggle to regain control of his mind and fate, *Minority Report* isolates the convention of cognition-as-

video within the precogs as part of a dystopian machinery that robs subjects of their humanity.

Minority Report's John Anderton is the Chief of the Precrime Division of Washington, DC. His job is to supervise the arrest and detainment of all criminals who will commit murder, but have not yet. Through the psychic visions of three "pre-cognitive" mutants, Anderton discerns who the murders will be and can dispatch arrest teams to prevent any actual murders from happening. Amazingly, the mutants don't say anything directly to Anderton in order for this system to work. Instead, their minds are made legible by machinery. In Dick's short story, the mutants babble incoherently only to be recorded on audiotape and translated by "analytical machinery" (325). Through transcoding the taped verbiage into a series of punchcards, the whole apparatus eventually outputs a card with three lines of information: the perpetrator, the victim, and the time and date of the crime. But in Spielberg's film, the mutants need not speak at all. A computer interface translates the visions they "see" in their minds into a video feed that shows up on a giant set of screens.

Anderton's first investigation makes this clear. This investigation scene opens the film and establishes its neo-noir detective conventions, but the audience's introduction to precrime policework doesn't just ascertain whodunit or how. Through its entire performance, Anderton doesn't find criminals; his investigation is also a ritual that transforms mental visualizations into digital content. The scene begins with a series of vignettes that depict key moments in a double homicide. The sequence of events is nonlinear, and the film cuts to each new event using a seemingly arbitrary combination of dissolves, fades, and jump cuts. Some events take place in slow motion, some in reverse.

Others, such as when the murderer chases one victim into the bathroom or an extreme close up of water running over the edge of a bathtub-cum-grave, even feature speed ramping. Additionally, the focus of the images oscillates between sharp focus and linear blur. Though it is clear that these visual effects are meant to convey the broken and incomplete form that internal visualizations take, they are so intrusive that they end up remediating digital video as a way to make sense of the precognitions that open the film. While the final shot of the murder matches on a close-up shot of the eye of precog Agitha and tracks out in order to suggest all these visuals were from her mind, the cinematography and editing of each vignette suggests that there were at least thirteen different cameras used to previsualize the murders. Like the memory "videos" in *Paycheck,* then, these introductory images code themselves as digital video through nonlinear editing, complex objective cinematography, and special effects enabled by digital post-processing. Stored on the same kind of glasslike disks that serve as the portable storage that Anderton uses to archive his home movies, these precog reports enter the film's economy of digital media from the moment they are experienced mental content.

But the remainder of the opening scene draws this connection between video and experienced mental states much more literally, and it emphasizes the stakes of making thoughts digital: user management of image data. When Anderton begins his investigation, he begins with a small, carved sphere with the name of the perpetrator impressed on it. This object is the only output from the precogs not found in the images and sounds captured from their thoughts. Sphere in hand, he stands in front of a giant screen featuring the images from the pre-visualized murder as a series of frames, each

corresponding to a specific piece of the murder event. The precrime team then uploads a series of drivers' license photos to Anderton's display in order to match the name and face of the criminal, and these images line up alongside the video clips. Though the videos are technically digital content because they appear on a computer screen, the film makes the equation more concrete by creating a striking collage of data that juxtaposes mental visuals and images from government databases. The photos even slickly slide along the display to help Anderton find the most similar face.

After computer equipment produces an impressive tableau of thoughts-as-data, Anderton is free to "scrub" images for clues about the upcoming murder. This step is particularly significant because it establishes that images extracted from the minds of the precogs are digital-photographic; they are composed of a continuous fabric of pixels. Whereas the film began with a series of attempts to make the previsuals seem murky, broken, and cryptic, what remains of them after their summary distortion is actually a great deal of visual information, and the images resolve like high-quality digital images. The first thing Anderton does is search for some indication of a mailing address to help locate the crime. To do this, he freezes an image from the previsual feed that contains a newspaper in the lower-right corner, and then uses a gestural interface to enlarge the image so that he can read the mailing label on the front page. The resulting extreme close-up features the mailing label in sharp focus and full detail, although part of it appears washed out by sunlight. Even though Anderton declares the image "unclear," it is not because the precogs did not include key information it in their image stream, rather; it is because the image stream copied every detail down to the specific shape and

brightness of sunlight on the newspaper. Each enlargement and subsequent image resolution further installs the precog visuals as digital video.

Anderton's subsequent attempts to locate the murder function similarly. His screen shows a brick pattern isolated from the video, but it is only after Anderton zooms out does it become clear how meticulous his examination has been and how detailed the precog images are. From a shot of the bricks, he zooms out one step to reveal a window, and then two steps to show that the window was part of the upper-right quadrant of a much wider shot of the bedroom. Then the film cuts to a reverse shot of Anderton's face as he observes, "Original running bond brick pattern, Georgian details. Brick was re-pointed." While extracting the materials and architecture ostensibly help the precrime squad find the location of the murder (the criminal-to-be has moved since his last visit to the Department of Motor Vehicles), this process is remarkable because it demonstrates that images in the background that have nothing to do with the murder act itself are part of the pre-cog visualizations. These visualizations, even though they only show murders, do not demonstrate any other principle of exclusion for what they present. The same trick of using background details for clues allows Anderton to compare still captures of a man standing across the street from the scene of the crime and infer that there's a boy on a merry-go-round nearby. In one frame, the boy is on the left. In the next, he is on the right. By rapidly switching between the images Anderton sees the continuity of action between them, even if the boy is but a minor part of the pre-cog visual of the man in the park. By cross-referencing the location of parks and buildings with Georgian architecture, the police locate the crime and intervene at the last minute to apprehend the would-be killer. Importantly, the tools Anderton and his team use do not just treat these

images *like* digital video; these tools only work as demonstrated because the pre-cog visualizations *are* digital video. Without a continuous fabric of pixels, "scrubbing the image" would be impossible to accomplish. Without a series of different objective perspectives on the murder sequence, there would be no opportunity to examine the scene of the crime before the crime occurred. Anderton's tools work because the pre-cognitives don't see the future; they film it with an implied digital-cinematic apparatus. They may "see but not know," as Anderton's assistant reminds the audience, but their mode of seeing is decidedly constrained by the digital video idiom.

This trend continues with the Leo Crow incident that initiates the main plotline of the *Minority Report*. Not only does a long shot of the pre-cog chamber reveal three giant displays corresponding to each mutant's mental visualizations, but the output itself recalls the zero hour sequence of *Paycheck* in both form and content. When Anderton sees the Leo Crow murder materialize before him from the pre-cog feed, he sees himself from a variety of angles, including a medium shot that looks down the barrel of the gun he uses to kill Crow and a close up of the bullet wound in Crow's chest after Anderton pulls the trigger. Anderton's disorientation when seeing this unfold is important: he knows that he would not commit murder, yet he sees it happen anyway, shot for shot, as if he is watching himself in a film. The video idiom ensures that he watches himself, but he still does not believe what he sees. This disbelief is important given that the film later demonstrates that Crow is an accomplice in a plot to frame Anderton. His job is to pose as the man who kidnapped his son with the expectation that Anderton will kill him out of anger and revenge. But the pre-cognitives only see a film and categorize the sequence as a pre-meditated murder, fooled by the same illusion that is supposed to fool Anderton.

The same trick works for Lamar Burgess, director of precrime. Burgess cheats the pre-crime system by paying a third person to try to kill Anne Lively, resulting in the arrest of the dummy muderer. By costuming himself in the same way and choosing the same crime scene, however, Burgess is free to commit the murder himself, for although the precognitives "see" the murder before it happens, the precrime team discards the visions as an "echo," a kind of pre-cog déjà vu that takes the previous failed attempt as its antecedent. Like the other previsualizations, a series of objective shots comprise the murder sequence, many of them wide enough so that Burgess can conceal his identity. It isn't until later in the film that Anderton discovers what has happened, and he eventually connects the Crow and Lively murders as fabrications of the same designer. This discovery ultimately undoes the precrime system, for by the film's end the predictive powers of the precogs as well as the integrity of its founder are compromised.

But precrime does not fail because the pre-cognitives, in their negotiations of multiple time chains, are not accurate enough. Precog negotiation of multiple but related time chains is the key problem in the short story; because Anderton has access to their reports, the precognitives adjust their prophecies in a causal chain with one another instead of producing a composite report. For Dick, precrime only misapprehends the future when the subject of the prophecies has access to that future. But the film does not similarly emphasize this meditation on free will. In *Minority Report*, precrime fails for the very reason that makes its spectacle possible in the first place: the constraint of previsuals within digital video. The same format that allows the chief to pull brick detail from a fragment of a distant building allows the system to be fooled by costuming and posing. The content of the future is visual only. Unlike the Dick short story where the

precognitive mutants babble all manner of details about the murder to be translated and distilled into prediction by machinery, Spielberg's film depends on human interpretation of the visual evidence. Moreso than the short story, the users of precrime technology in *Minority Report* are the ones responsible for the semantic content of the visualizations. Humans convert videos into prophesy through elaborate and spectacular image-processing technologies, but that video turns out to be an insufficient database from which anyone can predict the future.

Thus, *Minority Report's* digital video trope, wholly derivative of consumer electronics, organizes computers and cognition to contain the possibilities of the digital. The most impressive scene in the film is also the one in which Anderton uses a gestural and cinematic interface to subordinate both video and cognition within a broader framework of consumer entertainment. Standing before his giant glass displays with his arms out like a conductor, Anderton initiates the precrime image processing computer as the house lights dim and classical music plays from ambient speakers. A long shot of Anderton facing the screen and lifting his arms begins the symphony, and images blink into view over his shoulder. From here, medium shots from either side of the transparent screens showcase his studied expression and control of the data that floats ethereally in front of him. On each hand he wears black gloves with glowing sensors built into them, so that every movement of his arms and hands corresponds with manipulations of the images before him, from arranging various frames like a Windows computer, to enlarging images, to manipulating their playback. His movements display no hesitation, and the interface is flawless, a choreography that only manifests as choreography when Witwer tries to shake his hand and all the images collapse into a lower corner. In other words, *his*

control of the information is perfect as both a performance and an investigation. The effect is total delight. Before Anderton starts up the computer for the second investigation of the film, his assistant Jad even exclaims, "I love this part." In effect, Anderton's conductor's studio terminal, like the throne of the prediction machine in *Paycheck*, emphasizes the basic informatics of gadgets—human user in charge of curating and maneuvering through a database—while also remediating their consumer content through the trope of cognition as digital video.

Where the short story resolves itself with an unsettling (and possibly parodic) resignation to the concept of predestination, the film uses the trope of consumer video as a means to enforce limitations on the digital as a means for understanding human life and destiny. Anderton's suite of tools and psychic video feed, no matter how exhilarating their presentation, are ultimately part of a dystopian regime of panoptic surveillance that disempowers humans by reducing them to parts of a larger stream of digital video. The mise en scene of the film generally exhibits high contrast lighting and low color saturation, but it presents computer use in especially cool and depleted terms. The Department of Precrime Headquarters is composed of sterile blue and white tones, with glass contraptions and bright lights contrasting the blacks and blues of uniforms, shadows, and officious suit coats. The "temple," the chamber housing the precognitive mutants, holds the pre-cogs in a dark chamber lit only by a bright, luminous fluid that suspends and nourishes them. The fluid is so bright that it overexposes portions of the precog's faces, literally keeping them alive but visually trapping them in nightmarish unlife. While much of the film's lighting and set demonstrate the basic formal qualities of light and color of the precrime building, the temple and precrime facility stand as the

film's first and most extreme examples of this aesthetic. Precrime introduces the audience to the world of the film, and nowhere else appears as devoid of any utopic formal elements. Foiling the plentitude of color and energy characteristic of Richard Dyer's description of early musicals, the Department of Precrime enacts dystopia on both referential and non-referential levels, as the temple and headquarters also enable the surveillance regime that dominates the film's visuals and diegesis. [146] Ubiquitous retinal scanning, person-hunting robots, and cars whose control can be arrested by the authorities at any moment: these are the discursive counterparts to the non-discursive formal composition of the film's dystopia By extension of the precedent set by the precrime building, Anderton's apartment, where he abuses drugs and watches home video files on his computer, exhibits similar mise en scène. The images he watches in 3D are pale and washed out; his apartment is dark and poorly lit; what little lighting there is creates unsettling overexposures. This high contrast lighting and sterile setting that accompanies computing invokes the *noir* filmic tradition with digital technology. The resulting visual association makes computing a brooding and morally desolate realm of activity and technologies. Using the precogs as both video equipment and the epicenter of the film's neo noir aesthetic, then, shifts the cause of dystopia from the permanent generic fabric of the film to the consequences of a specific technology, conceived instrumentally.

That Anderton uses the precogs like a video gadget as opposed to a more cybernetic system of minds, brains, and computers leaves open that possibility that they along with everyone else affected by precrime can eventually escape from the prison of the digital. In contradistinction to the mise en scene for the majority of the film, the concluding scene demonstrates everyone's liberation from the chilling world of precrime.

A string symphony plays and the film cuts to a long shot of the precrime jail, now filled with yellow light and empty of any prisoners. Anderton's voiceover informs the audience that "all prisoners were unconditionally pardoned" as the film cuts to a shot of the precog temple laying dormant. Even Anderton's apartment, the subject of the next cut, exhibits warmer lighting in the background as he and newly-pregnant wife Lara cuddle in the foreground. That background warmth matches with the next cut, which shows the precogs in a remote coastal cottage bathed in warm light. Two sit by a fireplace, their hair grown out and shining in the late afternoon sunlight. The third, Agatha, reads with a mountain of books in the foreground. The shot tracks backwards to show off their new home, finished with wooden floors and antique furniture. The film ends with an extreme long shot of the cottage by the shining water as Anderton announces that the precogs "were transferred to an undisclosed location…a place where they could find relief from their gifts...a place where they could live out their lives in peace." This final shot is reminiscent of the final moments of the theatrical release of *Bladerunner*. Landscape, books, sunlight, fireplaces—these are the visual means through which the film mobilizes romantic conventions to recuperate the precog's humanity. A gadget model of the brain-computer relations instead of a cybernetic one is crucial to bring about this kind of conclusion. Such a model ultimately protects the film's characters from contamination with posthuman ontology by naturalizing a visual logic that remediates consumer technologies. As long as the temple and Anderton's conductor's studio remain empty, there is no posthuman dystopia. While this seems a naïve conclusion, it is the substance of the Hollywood happy ending. Giving audiences what they want, the film portrays precrime as a monstrous gadget because it uses humans

as technology. In doing so, all the film need do is set the misbehaving gadget down to restore liberal humanity to its primacy in the future world.

IV. Gadgets and the Human Imagination

Like the identity of Jennings, which manages to remain intact even after various technologies probe and cleanse his experiences from the video gadgets that are his brain, personal qualities of gadget users are not derived from specific database content; rather, they emerge as a function of owning and using the gadgets themselves. This inversion is not mere technological determinism. Considering the gadget as cinematic form extends my argument that the gadget is a metaphor performed throughout American culture, not just a taxonomical category of physical devices. The gadget, first and foremost, is a technology of the imagination. This insight takes us full circle in our study of *Paycheck* and *Minority Report*; gadgets aren't simply the technical objects of the films' narrative action, they are a structural quality of their logic and fantasy.

By recognizing gadgets and their activity through consumer marketplaces, global capitalism, popular cultures of use, literature, and film, we move from a formal analysis of *Paycheck's* fascination with digital video toward a more complete body of theory for the study of modern and contemporary technoculture. As long as the frantic and present tense of hardware consumption, media collection, and hyper-human sovereignty promised by gadgets endures, there can be no unmitigated turn toward the posthuman, no matter how ubiquitous our computers, no matter how advanced our cybernetics, no matter how repetitive our prefixes.

CONCLUSION: "I AM IRON MAN"

As we have seen throughout this study, gadgets in the U.S. are and have been a persistent trope through which subjects see themselves as empowered managers of technology, information, and the tasks that populate their day-to-day lives. The specific mechanisms through which segments of American literature and popular culture sustain and propagate gadgets teach us that gadgets contain more than just utopian dreams of the human user's sustained relevance into the future; they fundamentally conflate fun and hope. This conflation is not the same as Jamesonian "utopian impulses" in literature and entertainment. For the imaginary of American gadgets, utopia can be achieved only through entertainment.

In *Iron Man 2* (2010), Tony Stark proclaims to an adoring crowd, "I am Iron Man. The suit and I are one." Despite the first and most convenient interpretation of this statement, Stark's is not a posthuman perspective. The Iron Man suit is a gadget with exhilarating potential. It rests in Stark's garage alongside his other toys and gadgets: computers, sports cars, gigantic interactive displays, voice-activated media. He even has a gadget to keep track of his blood chemistry (there are medical consequences to having a power plant embedded in one's chest). The suit is part computer, part jet, part battery—all of which are more powerful than their everyday antecedents. When Stark says that he "is Iron Man," he isn't having a conversation about metaphysics. He is having a conversation about what he wants. He is confessing that he wants to keep the competence, managerial subjectivity, and thrilling entertainment that the Iron Man armor provides. The "I" of "I am Iron Man," like the "i" in iPod, points out the importance of

entertainment technology to contemporary sensibilities of personhood, not the cybernetic integration of human and machine.

The film may provide gritty shots of the power plant slowly poisoning the blood vessels under his skin, but the posthuman idea that humans and technology are part of a cybernetic circuit stops there, and Stark eventually finds a way to engineer a solution to ensure that his energy source remains a cosmetic addition to his naked chest, not a systemic modification brought about by nonhuman technology. Instead of depicting any real circuit between human and technology, the film turns on Stark's dramatic resolution of his power plant problem, discovering powerful, clean energy. Crucially, Stark does this by scouring his father's archive with a gigantic gestural interface that projects room-sized images into the air so that Stark can manipulate them using the same basic gestures as a MacBook trackpad. The scope and scale of the images he creates are literally amazing, and the conducting of data that he brings about resonates with Anderton's performance in *Minority Report*. To save himself, to save the Iron Man lifestyle he will not give up, to ensure that the American white male bachelor and gadget master fun will continue, Stark relies on techno-magical entertainment. In this formulation, entertainment begets entertainment. Shortly after this epiphany, Stark uses his newly enhanced armor to obliterate an army of robot drones and save Manhattan. Achieving world peace, having fun, ensuring national security, and showing off hyperhuman and hypermasculine strength all boil down to using entertaining personal technology. From the beginning, Tony Stark created the Iron Man armor to simultaneously enhance his own body and protect the US, killing foreign terrorists and putting on a light show at the same

time. In this film, entertainment is both the tool and the outcome, the tautological present/future of technology use and US nationhood.

Figure 1: In this scene at a USO show in Afghanistan, *Iron Man 2* shows that Tony Stark supports the troops

But as baldly obsessed with gadgets as *Ironman II* is, even it concedes that this kind of tautology is only sustainable so long as the technology at hand is not obsolete. Like Obama's Blackberry, the Iron Man armor needs frequent replacements. If it has no more surprises to unveil, if its secrets are common knowledge and its capabilities commonplace, the Iron Man armor, along with every other gadget, loses its capacity to amaze and privilege a position of supreme managerial power. And through obsolescence, hardware failure, or dead batteries, all gadgets must die. To solve this problem in the film, Stark invents a better miniature power plant that will nourish all his future inventions. To solve this problem in the marketplace, American gadgets contain within them the promise of new and improved hardware. An individual purchase resembles a rental more than anything else because while one can stretch an automobile purchase to last a decade, the same is not true of a mobile telephone, portable media player, or laptop

computer. Gadgets will always be near-new because one will always know that gadgets are becoming obsolete even as one uses them for the first time and always count on buying a replacement for the always-becoming obsolescent technology that one owns. But while Stark's is an elegant solution that works marvelously within the confines of fiction, the frenetic pace of obsolescence and hardware replacement creates a rhythm of disposal and replacement that can only last for so long. This is not to roundly conclude with an ecocritical perspective that emphasizes the waste produced by the electronics industry in the US and worldwide, though the impact of the latter is dire and in need of attention. Instead, I want to emphasize that the 20th and early 21st-century gadget's strategy for establishing ever-present novelty is more forward looking than even science fiction novels and films. More specifically, it is a special subgenre of everyday science fiction more concerned with the future than anything else.

Narratively, twentieth and twenty first-century science fiction novels, stories, and films describe a future temporality, but through their narratives they create a stable time and place, even if this future is always speculative. Gadgets, on the other hand, always gaze at the horizon of the next development to come. Each device is part of a narrative with no definite conclusion. "I am Iron Man," therefore, also speaks to Stark's personal investment in seeing himself in the future. Thus, when the *Iron Man 2* ends with S.H.I.E.L.D. recruiting agents concluding their evaluation with, "Iron Man: Yes. Tony Stark: No," Stark stares in disbelief. Not only can he not comprehend the idea that he and the suit are distinct entities, this statement also threatens his future role in the film's sequel. While it seems doubtful that producers would ever abandon a bankable star like

Downey Jr., the film's final moments do underscore the relationship between gadgets and futurity. Without gadgets, one is condemned to live only in the present.

Thus, "I am Iron Man" encapsulates a much broader fascination and lifestyle in the U.S. that relies on speculative and science fiction to cohere. It is a commitment to entertainment as a way to conceptualize time. It means "through gadgets I can matter now and forever." It is a mantra worth billions that has spanned a half-century. It will be part of the next half-century, real, imagined, and everything in between.

NOTES

[1]From Consumer Electronics Association, Presentation by Parker Brugge to E-Scrap Conference, Sept 17, 2008, qtd in"Facts and Figures on E-Waste Recycling," Electronics Takeback Coalition. March 8 2010, 3

[2] http://tech.fortune.cnn.com/2009/08/05/goodbye-ipod-hello-iphone/
[3] http://money.cnn.com/2010/06/24/technology/iphone_4_availability/index.htm
[4] "Measuring the Information Society." A report from the International Telecommunication Union, 2009, Page 3. http://www.itu.int/ITU-D/ict/publications/idi/2009/material/IDI2009_w5.pdf

[5] Citing a number of studies, Car and Driver conducts its own study here: http://www.caranddriver.com/features/09q2/texting_while_driving_how_dangerous_is_it_-feature/the_results_page_2

[6] Michael Santo, "iPad Sales hit 3,000,000 in 80 days." Examiner.com, n.d. Web. 15 July 2010. <http://www.examiner.com/technology-in-national/ipad-sales-hit-3-000-000-80-days>

[7] Vista, the version of the Windows operating system released in 2007, features small, single-function programs that operate in the desktop environment and often take on the appearance of small electronic devices with screens, buttons, and sleek form factors.

[8] Cathy Davidson and David Theo Goldberg, "A Manifesto for the Humanities in a Technological Age." *The Chronicle of Higher Education* 50.23 (2004): B7.

[9] Paul du Gay, S.H. *Doing Cultural Studies: The Story of the Sony Walkman*. London, New Delhi: Sage, 1997.

[10] Alfred Chandler, Inventing the Electronic Century: The Epic Story of the Consumer Electronics and Computer Industries (New York: Free Press, 2001) 18.
[11] Chandler 6.

[12] Chandler 7.

[13] Chandler 31.

[14] Chandler 8.

[15] Hayles 8

[16] For a basic description of the cyborg metaphysic, see Katherine Hayles, *How We Became Posthuman : Virtual Bodies in Cybernetics, Literature, and Informatics,* 2. For a broader discussion of the potential variation in the ownership of posthuman identity, see chapter 11. For a compelling articulation of posthumanism (broadly understood) with contemporary trends in computational thought, see chapter one of Hayles, *My Mother Was a Computer : Digital Subjects and Literary Texts*. Again, however, gadgets as described by this project, however, help describe the other half of the problem, where computational ideologies do not penetrate certain areas of social activity, commercial markets, or cultural practice.

[17] Like the narcosis described in chapter 4 of Marshall McLuhan, *Understanding Media : The Extensions of Man*. 1st MIT Press ed. (Cambridge: MIT Press, 1994). This gadget phenomenon is a denial of electronic media's extension of (and extension within) the human form. The slippage between narcissism and narcosis is fitting for such technologies of style and self-articulation.

[18] See "The Digital Dump: Exporting Re-use and Abuse to Africa," Basel Action Network. 24 October 2005

[19] See Wataru Nakayama, William Boulton, Michael Pecht, *The Japanese Electronics Industry*. (Boca Raton: CRC, 1999) 30-32, 59. See also Roger Handy, Maureen Erbe, Aileen Antonier, and Henry Blackham, *Made in Japan: Transistor Radios of the 1950s and 1960s.* (New York: Chronicle Books, 1993)

[20] See http://www.youtube.com/watch?v=_gzFht3TzZ8

[21] Lizabeth Cohen, *A Consumers' Republic: The Politics of Mass Consumption in Postwar America* (New York: Knopf, 2003) 14.

[22] Cohen 28

[23] See Cohen, Chapter 3 for a more in-depth explication of co-evolution of these two concepts in postwar US

[24] Kathleen Woodward, "Introduction," *The Technological Imagination*: *Theories and Fictions*. Teresa De Lauretis, Andreas Huyssen, and Kathleen Woodward, eds. (Madison: Univeristy of Wisconsin, 1980) 1-9, 5.

[25] Carroll Pursell, "The American Ideal of a Democratic Technology," *The Technological Imagination*: *Theories and Fictions*, 11-27, 11-15.

[26] Slavoj Zizék, *The Sublime Object of Ideology*. (New York: Verso, 1989) 28-33.

[27] This prototype of the ROKR E8 displayed at the University of Illinois, while not an exact duplicate of the production model, possessed the same "morphing" interface of the device released in 2008: http://direct.motorola.com/hellomoto/rokre8/.

[28] Norman Klein, *The Vatican to Vegas: The History of Special Effects.* (New York: New Press, 2004) 10.

[29] Klien 66

[30] Alan Liu, *The Laws of Cool*: *Knowledge Work and the Culture of Information.* (Chicago: University of Chicago Press, 2004) 115.

[31] Pamela Smith, *The Business of Alchemy*. (Princeton: Princeton University Press) 4.

[32] Smith 174

[33] Smith 173
[34] Smith 270-271

[35] Gavin Weightman, *Signor Marconi's Magic Box.* (New York: Harper Collins, 2004) xv-xvi

[36] ibid 24

[37] Deleuze, Gilles and Félix Guattari. 1972. *Anti-Oedipus*. Trans. Robert Hurley, Mark Seem and Helen R. Lane. (London and New York: Continuum, 2004) 2-10

[38] For both pictures and a brief discussion of the Nylon exhibit at the 1939 World's Fair, see http://invention.smithsonian.org/centerpieces/whole_cloth/u7sf/u7materials/nylondrama.html

[39] Mossman, Susan. "The Technology of Early Plastics." *The Plastics Age: From Bakelite to Beanbags and Beyond*. Ed. Penny Sparke, 17-23. Woodstock: Overlook, 1994.

[40] Mossman 19

[41] ibid

[42] Mossman 20

[43] Mossman 21

[44] ibid

[45] Jeffrey L Meikle, *American Plastic: A Cultural History*. (Piscataway: Rutgers University Press, 1997) Meikle 11.

[46] Meikle 15

[47] Meikle 11-17

[48] Meikle 27

[49] Meikle 67

[50] Penny Spark, "Introduction: On the Meanings of Plastics in the Twentieth-Century." *The Plastics Age: From Bakelite to Beanbags and Beyond*. Ed. Penny Sparke (Woodstock: Overlook, 1994) 34-39; 35.

[51] Jeffrey L. Meikle, "Plastics in the American Machine Age," in *The Plastics Age: From Bakelite to Beanbags and Beyond*, edited by Penny Sparke. (Woodstock: Overlook, 1994) 43-51; 45.

[52] ibid

[53] ibid 44-45

[54] Meikle 1994, 46

[55] Meikle 1994, 52

[56] Meikl 1994, 53

[57] Paul Frankl*, Form and Re-Form: A Practical Handbook of Modern Interiors*. (New York: Harper and Brothers, 1930) 90.

[58] Meikl 1997, 65

[59] Edwin Slosson, *Creative Chemistry*. (New York: The Century Co, 1919) 6-13

[60] Slosson 134-135

[61] Slosson 135

[62] Burr Leyson, *Plastics in the World of Tomorrow*. New York: EP Dutton, 1946) 30.

[63] Leyson 32

[64] Leyson title page

[65] Claire Catterall "Perceptions of Plastics: A Study of Plastics in Britain, 1945-1956."

The Plastics Age: From Bakelite to Beanbags and Beyond. Ed. Penny Sparke. (Woodstock: Overlook, 1994) 67-74; 67.

[66] V. E. Yarsley and E. G. Couzens, *Plastics*. (New York: Pelican Books, 1941) 152.

[67] V.E. Yarsley *Plastics in the Service of Man*. (New York: Penguin, 1956) 284.

[68] ibid 288

[69] see the website of Dr. Steve Reyer dedicated to the history of this handset: http://people.msoe.edu/~reyer/regency/

[70] Michael Brian Schiffer, *The Portable Radio in American Life*. (Tuscon: University of Arizona Press, 1991) 178.

[71] Schiffer 193

[72] Schiffer 223

[73] Reyer

[74] Schiffer 211

[75] Roger Handy, Maureen Erbe, Aileen Antonier, and Henry Blackham, *Made in Japan: Transistor Radios of the 1950s and 1960s.* (New York: Chronicle Books, 1993) 9.

[76] Handy 65-67

[77] ibid

[78] Schiffer 177-178

[79] Schiffer 156-157

[80] Schiffer 190; 194

[81] Schiffer 181; Handy, 46

[82] Meikle 1994, 48

[83] Schiffer 222

[84] See Luc Herman; Petrus van Ewijk, "Gravity's Encyclopedia Revisited: The Illusion of a Totalizing System in Gravity's Rainbow," *English Studies*, 2009, 90.2: 167-179.

[85] Arich-Gerz, Bruno, "The Comet and the Rocket: Intertextual Constellations about Technological Progress in Bruno Schulz's "Kometa" and Thomas Pynchon's Gravity's Rainbow*" Comparative Literature Studies*, 2004, 41.2: 231-256, 236.

[86] Even Steven Weisenburger's excellent second edition to the *Gravity's Rainbow Companion* (Athens: University of Georgia Press, 2006), makes no entry on the plastic itself, although it does discuss IG Farben and other notable developers of plastics in the early twentieth century.

[87] Thomas Pynchon, *Gravity's Rainbow*. New York: Viking, 2000.

[88] Meikle asserts that Pynchon's writing here echoes the "litany of plastics promoters," (1995, 294).

[89] This is true of plastics technology for both the 1940s and 1970s.

[90] See Pynchon 572, 643 for examples of this trend in representation

[91] "The freaks of Psi Section" mentioned early in the novel seem to be literally paranormal in their psychic ability, but the psychometrists and their operations eventually lose their funding. This is an inverse of the techno-paranormal displayed by Imipolex; science trying to account for the paranormal instead of the paranormal generated out of the methods of science (148).

[92] see 572, 643 for examples

[93] Darko Suvin *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre*. (New Haven: Yale University Press, 1979) 7-8.
[94] Katherine Hayles, *How We Became Posthuman : Virtual Bodies in Cybernetics, Literature, and Informatics*. (Chicago: University of Chicago Press, 1999) 210.

[95] See Robert Cummins, "Mental Representation," *Blackwell Companion to Epistemology*. (London: Blackwell, 1992) 442. See also Pierre Barrouillet, et al. "Conditional Reasoning by Mental Models: Chronometric and Developmental Evidence." *Cognit*. (2000) 237-266

[96] http://www.uie.com/brainsparks/2008/03/05/magic-and-mental-models-using-illusion-to-simplify-designs/

[97] Henry Mintzberg, *The Nature of Managerial Work*. (New York: Prentice Hall, 1973). Cited in Terry Winograd and Fernando Flores, *Understanding Computers and Cognition.* (Norwood: Ablex, 1986) 151.

[98] Cummins 444

[99] Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society.* (Cambridge: Harvard University Press) 90.

[100] Latour 89

[101] Mark H. Clark, "Product Diversification" *Magnetic Recording: The First 100 Years*. Eric Daniel, C. Denis Mee, Mark H.Clark eds. (New York: Wiley-IEEE, 1998) 92-109, 97.

[102] Clark 100-102

[103] Clark 102-103

[104] Clark 104

[105] Clark 104

[106] Don Humphries, "The 8-Track/Cassette Cold War Gets Warmer," *Audio*, January 1970, 54: 50-51 (50).
[107] Humphries 51

[108] Robert Angus, "History of Magnetic Recording, Part II," *Audio*, September 1984, 68: 33-39 (36).

[109] Clark 104-105

[110] Thurston Moore, *Mix Tape: The Art of Cassette Culture* (New York: Universe Press, 2004) 13.

[111] For an example of this dialectic in Hayles work on the writings of cyberneticist Norbert Weiner, See *How We Became Posthuman*, 105

[112] Hayles, "The Condition of Virtuality," *The Digital Dialectic: New Essays on New Media.* (Cambridge: MIT Press, 2000) 68-95, 69.

[113] Lev Manovich, The Language of New Media. (Cambridge: MIT Press, 2001) 224.

[114] Philip Mirowski, *Machine Dreams: How Economics Becomes a Cyborg Science.* (Cambridge: Cambridge University Press) 367.

[115] Stanford Encyclopedia of Philosophy: http://plato.stanford.edu/entries/prisoner-dilemma/

[116] Jean Baudrillard, *Simulacra and Simulation* (Ann Arbor: University of Michigan Press, 1994) 1.
[117] Katheryne Lindberg, "William Gibson Among the Subjectivity Mechanisms," Boundary 2 23:2 (Summer 1996) 47-83, 70

[118] Stephenson 22-23

[119] Alan Liu, *The Laws of Cool: Knowledge Work and the Culture of Information.* (Chicago: University of Chicago Press, 2004) 102. See also Dick Hebdige, *Subculture: The Meaning of Style.* (London: Methuen 1979) 148-150.

[120] Tom Gunning, "The Cinema of Attractions," *Wide Angle* 8.3-4 (1986): 64-65

[121] Liu 127

[122] Liu 101

[123] Liu 102

[125] Jose Van Djick, "Memory Matters in the Digital Age," *Configurations* 10 (2004): 349-373.

[126] Van Djick, 353. For another perspective regarding the complexity of mental imagery and memory, see Stephen Kosslyn et al., *The Case for Mental Imagery* (New York: Oxford, 2006).

[127] See Denise Cummins, "A History of Thinking," in *Minds, Brains, and Computers: The Foundations of Cognitive Science*, ed. Denise and Robert Cummins (London: Blackwell, 2000) 8-20, for a more in-depth conversation of how the cognitive sciences developed from early mathematical theory and pragmatic philosophy.

[128] Denise Dellarosa Cummins, 13-14; See also Hayles, *How We Became Posthuman : Virtual Bodies in Cybernetics, Literature, and Informatics*, chapters 1-4, where Shannon's theory of information is a key narrative in the development of a particular brand of posthuman thinking that takes information as separate from its material medium.

[129] Denise Dellarosa Cummins, 14

[130] Denise Dellarosa Cummins, 14-15; Ulrich Neisser, *Cognitive Psychology* (Englewood Cliffs, NJ: Prentice Hall, 1967) 8-11(doubts expressed in the formative years of the discipline, even before the moniker of "cognitive science" became ubiquitous); Max Werthemier, "A Gestalt perspective on computer simulations of cognitive processes," *Computers in Human Behavior*, 1, (1985) 19-33 (Cummins takes the former and the latter as two key examples in demonstrating this skepticism in computers as tools to understand

human cognition); John Searle*, The Mystery of Consciousness* (London: Granta, 1997). For more on putting pressure on brain/computer comparisons and possible departure from the paradigm, see pages 15 and 19.

[131] Denise Dellarosa Cummins and Robert Cummins, "The Mind as Neural Network: Introduction," in *Minds, Brains, and Computers: The Foundations of Cognitive Science*, ed. Denise and Robert Cummins (London: Blackwell, 2000) 171-178.

[132] Denise Dellarosa Cummins and Robert Cummins 173-174

[133] Connectionists still operate from the fundamental assumption that activity within a computer architecture is suggestive about what goes on in a human brain. They are still "computational" in a broader sense.

[134] Denise Dellarosa Cummins and Robert Cummins, "The Mind as Neural Network: Introduction,"176-177

[135] Denise Dellarosa Cummins and Robert Cummins, "The Mind as Neural Network: Introduction," 174-175

[136] Denise Dellarosa Cummins and Robert Cummins, "The Mind as Brain: Introduction," in *Minds, Brains, and Computers: The Foundations of Cognitive Science*, ed. Denise and Robert Cummins (London: Blackwell, 2000) 321-322. Here, bottom up approaches to artificial intelligence may suggest that the initial goals of studying higher brain function through computer modeling may not be possible after all. For an example of a more specific critique of computationalism, see Stevan Harnad, "Against Computational Hermeneutics," Social Epistemology, 4, (1990) 167-172.

[137] Jerry Fodor, "Precis of The Modularity of Mind," Behavioral and *Brain Sciences* 8.1, (1985): 1-42.

[138] Fodor, 35-36 [3]

[139] Fodor, 36-37 [3]

[140] For a preliminary set of examples of this trend, see David Chalmers, "On Implementing a Computation", *Minds and Machines* 4 (1994) 391-402; John McCarthy, "Ascribing Mental Qualities to Machines," in *Philosophical Perspecitives in Artificial Intelligence*, ed. M. Ringle, (Brighton: Harvester, 1979); Aaron Sloman, "Beyond Turing Equivalence," in *Machines and Thought: The Legacy of Alan Turing vol. I,* ed. J.R. Millican and Andy Clark (New York: Oxford, 1996) 179-219. These examples barely scratch the surface of the field and vary in approach, but they all take as a core assumption the idea that material computational architechures can be used to understand human brain activity because of the structural parallels between the former and the latter.

For a computer scientist's contrasting take on how brain-machine metaphors often impoverish studies of intelligence, and therefore need further revision, see Bruce Edmonds, "The Constructability of Artifical Intelligence (as defined by the Turing Test)," *Joural of Logic, Language, and Information* 4 (2000): 419-424.

[141] XP media center was released in 2004 and *Paycheck* in 2003; the two are roughly contemporary and comparable. Some of XP's touted new features included enhanced software that made playback and organizing media easier, as well as a software that would interface with a remote control that could operate the media player of the computer from up to 10 feet away.

[142] *Paycheck,* DVD, directed by John Woo (2003, Hollywood, CA: Paramount, 2004). This kind of sequence repeats throughout the film as Jennings struggles with memory erasure and then, subsequently, recovery of the erased memories.

[143] My use of both terms "mind" and "brain" is in no way meant to conflate them. However, it is not the object of this paper to settle the broad debate about the relationship between mind and brain. I am concerned specifically with how this film in particular imagines the correspondance of physically detectable phenomenona with conscious experience and memory. For a connectionist perspecitive from a philosopher of mind that engages the western philosophical tradition of the mind/brain problem as well as developments in neuroscience and cognitive science, see chapters 7 and 8 of Patricia Smith Churchland, *Neurophilosophy: Toward a Unified Science of the Mind-Brain* (Cambridge: MIT, 1986); Sections I.3-I.4 of Robert Harnish, Minds, Brains, and Computers: An Historical Introduction to the Foundations of Cognitive Science. (London, Blackwell 2002) 55-76.

[144] By this I mean to reference the body of theory that N.K. Hayles both curates and authors in her studies of cybernetics, posthumanism, and contemporary technoculture, as well as the boom in cyborg studies generated by Donna Harraway's "Cyborg Manifesto." See N. Katherine Hayles, *How We Became Posthuman : Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago, Ill.: University of Chicago Press, 1999), N. Katherine Hayles, *My Mother Was a Computer : Digital Subjects and Literary Texts* (Chicago: University of Chicago Press, 2005). Donna Jeanne Haraway, *The Haraway Reader* (New York: Routledge, 2003). Generally speaking, this perspective focuses on the breakdown of the distinction between human and technology, mind and computer. See also Mark B. N. Hansen, *New Philosophy for New Media* (Cambridge, Mass.: MIT Press, 2004); Timothy Lenoir, "Makeover: Writing the Body into the Posthuman Technoscape," *Configurations*. 10. 2 (2002): 203-220; *Richard Doyle, Wetwares : Experiments in Postvital Living,* Theory out of Bounds (Minneapolis, MN: University of Minnesota Press, 2003).respecitively.

[145] Denise Delarosa Cummins and Robert Cummins, "The Mind as Computer: Introduction," in *Minds, Brains, and Computers: The Foundations of Cognitive Science*, ed. Denise and Robert Cummins (London: Blackwell, 2000) 3-7.

[146] Richard Dyer, "Entertainment and Utopia." *Genre: The Musical: A Reader*. Ed. Rick Altman. (London: Routledge and Kegan Paul, 1981) 175-189.

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